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The Society for Technical Communication is the largest association of technical communicators in the world. STC is currently classifying the Body of Knowledge for the field and communicating the value of technical communication. Its volunteer leadership continues to work with government bodies and standards organizations to increase awareness and accurate perception of technical communication. Membership is open to all with an interest in technical communication. Visit the STC Web site (www.stc.org) for details on membership categories, fees, and benefits.

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# Technical COMMUNICATION

*Journal of the Society for Technical Communication*

# Technical
# COMMUNICATION

*Journal of the Society for Technical Communication*

NOVEMBER 2019

TECHNICAL COMMUNICATION: CELEBRATING DIFFERENCES AND INCREASING INTERCULTURAL BUSINESS

# INSTRUCTIONS FOR AUTHORS

## About the Journal

Technical Communication is a peer-reviewed, quarterly journal published by the Society for Technical Communication (STC). It is aimed at an audience of technical communication practitioners and academics. The journal's goal is to contribute to the body of knowledge of the field of technical communication from a multidisciplinary perspective, with special emphasis on the combination of academic rigor and practical relevance.

Technical Communication publishes articles in five categories:

- Applied research – reports of practically relevant (empirical or analytical) research
- Applied theory – original contributions to technical communication theory
- Case history – reports on solutions to technical communication problems
- Tutorial – instructions on processes or procedures that respond to new developments, insights, laws, standards, requirements, or technologies
- Bibliography – reviews of relevant research or bibliographic essays

The purpose of Technical Communication is to inform, not impress. Write in a clear, informal style, avoiding jargon and acronyms. Use the first person and active voice. Avoid language that might be considered sexist, and write with the journal's international audience in mind.

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# Research and Realities

You are likely familiar with the allegation that scholars live in ivory towers examining esoteric topics with little or no appreciation for the practical realities of daily life. I consider this claim as spurious as it is insulting because my impression from 40 years of toiling in universities as a teacher, researcher, and administrator is that a scholar's projects are almost always initiated by a lived experience (on the job, in the classroom, with family or friends, in the community). This lived experience makes a topic salient for the scholar, bringing the topic to the scholar's attention, inspiring curiosity about that topic, driving the effort to study that topic, and encouraging a systematic investigation to determine how typical or atypical is the scholar's individual experience.

I think of research as neither divorced from nor married to the realities of life but altogether engaged: That is, research arises from interactions with reality and develops—cautiously but optimistically—with the objective of knowing, appreciating, influencing, or changing this reality. This basis in reality, I think, is especially characteristic of research in technical communication, as the authors of the five articles in this issue make clear.

In "An Analysis of Physical and Rhetorical Characteristics of Videos Used to Promote Technology Projects on the Kickstarter Crowdfunding Platform," Aileen Cudmore and Darina Slattery examine 50 videos soliciting funding for technology projects (25 funded and 25 failed campaigns). Their analysis of the physical characteristics of the videos as well as the uses of rhetoric in the videos serves to identify key indicators of success or failure. For example, funded videos typically included frequent rhetorical appeals (to ethos and pathos, in particular), inserted still pictures, demonstrated a final version of the technology in question, linked images on screen to the audio narration, and put the inventor/entrepreneur on screen. No single video, however, included all the characteristics associated with funded projects. Aileen and Darina's study has important implications for technical communicators who design videos (and related information materials) for campaigns that solicit support for new ideas.

Their project has its basis in Aileen's experience with Kickstarter campaigns. As she explains,

> During a brainstorming session for the research project for my master's degree, I realized that I was interested in doing research on some aspect of videos, which I believed were becoming increasingly important as a communication tool. I already had an interest in crowdfunding campaigns and had previously supported a couple of Kickstarter projects. At the same time, two friends of mine were actually thinking of launching a Kickstarter campaign of their own. Both

were experienced researchers, were capable of writing successful proposals, and had even been published in journals. However, neither had any experience with creating a campaign video, and were quite daunted by this task and how to go about it.

> Then, when doing a little research into crowdfunding campaigns, I realized that the project descriptions were crucial in attracting funding from investors. However, most studies to that point had just looked at the written text on the project page, and very little had been done on the campaign videos themselves. So I thought that these could be an interesting thing to look at!

> In the end, my friends did go ahead with their Kickstarter campaign, and I was able to give them some advice on making their video. And, fortunately, their campaign was a success!

Darina was Aileen's thesis advisor and quite accomplished in writing for publication. She readily acknowledges, however, "I didn't have any experience with

Kickstarter campaigns before Aileen proposed the topic. The project was entirely her idea, and there was a learning curve for me in working on it."

As Aileen and Darina demonstrate, collaborators inspire each other with their lived experiences: Darina's experience with research and publication joined Aileen's experience with Kickstarter campaigns to generate their article in this issue of the journal.

Emil Towner's "Expository Warnings in Public Recreation and Tourism Spaces" reports on the results of a survey completed online by 303 participants regarding how the language of warning signs influences the recognition of risk and resulting behaviors to avoid risk. Emil's survey displayed a warning sign with either a brief or detailed message of risk and solicited the viewer's explanation of the sign's meaning. The findings of this study indicate that brief signs (e.g., No Diving) offer inadequate warning about identified dangers and insufficient instruction about effective safety measures. While urgency of the warning message and time for reading are important factors that encourage brevity, technical communicators must also consider the better insight (and potentially greater compliance and extrapolation to related conditions) that a detailed warning sign would generate.

Emil explains the practical origins of this article:

> About 15 years ago, my family took a vacation to Yellowstone National Park,

where we encountered a bison grazing in a field next to the parking lot of the Old Faithful Inn. A warning sign advised DANGER: DO NOT APPROACH WILDLIFE. We don't consider ourselves risk-takers, so we did not approach the bison. Instead, we stood behind a wood railing that separated the field from the parking lot and we took a few pictures.

> Later, we learned that numerous visitors to Yellowstone are injured by bison while doing the same thing we did. That is, the wood railing does not always deter bison and does not assure a zone of safety for visitors. Of course, we were horrified that we possibly endangered our family, but we also knew that we were following the posted sign (at least, we followed it based on our understanding of it). This experience prompted my interest in not only the safety/risk communication language but also the visuals used to warn people who visit dangerous public spaces.

> Over the years, the National Park Service has added additional warning signs but has still kept the vague signs (so different warning messages are located in different areas). After a high number of visitors were injured a few summers ago, I decided I wanted to research the warning signs to understand how visitors perceive and process the

messages. That research resulted in this manuscript.

In "Sounding Off: Toward a Rhetoric of Sound in Technical Communication," David Wright traces the uses of sound in technical communication through history and examines sound as linguistic, paralingustic, and extralinguistic communication. David proceeds from this foundation to build a theory of sound for technical communicators that includes a series of factors to consider, from the source (i.e., human or non-human) to the type of sound (e.g., dialogue, song, sneeze, quiet pause, piano music) and the type of rhetoric (i.e., deliberative, forensic, or epideictic). He proposes that the communicative effect of sound is a result of the linguistic, auditory, and rhetorical elements interacting with the audience. David's heuristic for systematic analysis allows technical communicators to develop judicious multimedia materials with greater efficiency and consistency.

David explains the experience that initiated this research project:

> Prior to life as a faculty member, I worked as a musician for years. During many performances, I noticed sound's ability to convey not only emotion but meaning. Musicians who play together for extended periods often use their instruments to convey thoughts to one another. Although this is usually done in a joking manner, it really does become a second language after a time. So, I've always

been interested in how sound conveys meaning. When I began to notice that sounds were truly breaking into mainstream technology as a substitute for text and speech, it seemed like a very natural topic to investigate further.

There is a long history of sound being used to communicate, but most of that history has centered on coordinating the efforts of large groups of people. Now, I believe, sound is becoming a primary communication device for personal items and digital machinery of all types. I was discussing this idea with a colleague, and our conversation turned to Britton's bugle call analogy. While it's true that technical writing has been "like a bugle call" in many respects, it has also been much more. Now that it is literally becoming a bugle call (at least in terms of sound conveying meaning through digital devices) it seems that the role of sound will only continue to expand in technical communication. I, for one, am interested to see what that future will hold.

In "Communication Strategies for Diagnosing Technical Problems at a Help Desk," Vincent Robles closely analyzes the interactions of 11 users with 6 technical support providers to identify the characteristics of their dialogue that contributed to user satisfaction. He finds that more description and narration from the user is associated

with greater user satisfaction, and he thus encourages technical support providers to solicit information from users through open-ended questions, which are more likely to generate more extensive conversation. Questions that focus on the user's needs, experiences, previous actions, and circumstances related to the technical problem prove especially productive. Technical support providers could also easily adapt the methods of data collection and text analysis employed in this small-scale study to determine the effectiveness of their interactions with their specific users.

Vince explains how he arrived at this project, linking his experience with help desks to his earlier experience with writing centers:

> I started interacting with the help desk I studied—as an observer and as a recipient of their help—a few years before working on this research project. I don't remember the exact problem I asked for help with, but it related to some aspect of my course website, especially the grading features. I do recall that much of my experience was of waiting while the tech support rep attempted to re-enact what I had tried to do. I also answered many questions about my previous attempts at solving the issue and what my problem experience was like.

> I was taking an organizational communication course at the time, and this help desk

was one of the most readily available sites of technical communication work, so I began interviewing the members (some of whom I knew) about their experiences.

The parallels to writing center tutorials immediately leaped to mind since I had worked in such tutorials before. And I wondered: Do language scripts help these technical-support persons communicate with users? What communication skills do these workers draw from?

I found the lack of communication research on these technical problem-solving conversations surprising, though the important role of communication was obvious to me. So, I determined to examine the conversations more closely, and this article represents the fruit of this research.

Michael Meng's "Effects of Visual Signaling in Screenshots: An Eye Tracking Study" reports the results of a usability experiment involving 32 human subjects. The experiment has two purposes: 1) to determine whether visual signals in screenshots for software tutorials effectively direct the user's attention to pertinent information in the screenshots and 2) to determine whether the visual signals in the screenshots influence the speed and accuracy with which the user executes designated tasks of the software tutorial. The findings indicate that visual signals did

encourage users to focus their attention on specific sections of the screen shots (for longer and more frequent periods) and did lead to higher accuracy (but no greater speed) in their completion of the tutorial. Michael's study has important implications for the design and annotation of screenshots in online tutorials, help systems, and related resources.

This empirical research project has its basis in Michael's earlier job experience:

> Before joining university, I worked as a technical writer in a software company in Germany for more than a decade. When the company planned to release a new product line several years ago, our team was asked to design and implement a browser-based online help from scratch. This task provided us a rare opportunity to evaluate and challenge everything we had done so far, including questions regarding the content to present, information structure and design, presentation format, tools, and processes. As part of the evaluation, we also discussed how to deal with screenshots, such as whether we should use screenshots at all, when to use screenshots, and how to design them. We quickly came up with several arguments against using screenshots that were mostly related to the additional effort and cost screenshots add to initial development as well as maintenance and localization. We found it much more

difficult to generate equally convincing arguments in favor of using screenshots, so we finally decided to do without screenshots in the first release.

> A while later, I came across the work of Hans van der Meij and his colleagues on screenshot usage, including the articles published in this journal. I immediately felt that work like this would have helped me and my team make more balanced decisions because this research demonstrates that screenshots can support the user. Knowing that screenshots can have this impact, in turn, can help to form arguments that possibly justify the additional costs incurred by screenshots. I thus recognized how research can help technical writers make more informed decisions and, in particular, decisions that fully appreciate the user perspective aside from all the cost and effort considerations.

> I took this experience related to screenshots and combined it with my interest in eye tracking from my background in psycholinguistics, where eye tracking has been used to study cognitive processes related to language production and comprehension. While eye tracking has been used successfully in some areas of technical communication, such as usability evaluation, I realized that eye tracking studies might also help us better understand how users actually deal with information technical

writers provide to them— not only which information users attend to and select but which specific activities they undertake in response to that information. I would be more than happy if my contribution in this issue triggered greater interest in using eye tracking as a research method in technical communication.

In each of the five articles in this issue, lived experience is the foundation for research. The scholars derive insights from their experience, discover and analyze related experiences, think through the implications of their findings, and generate perceptive insights to inform and guide your experience.

Among the multiple possibilities for failure in this fragile process is the clear communication of pertinent new insights—that is, in scholars effectively sharing with you the practical meaning of research that arises from the practical realities of their lives, of making their lived experience of a topic—interpreted and intensified through research—important to your lived experience of that topic.

Manuscript reviewers are essential to mitigate this potential failure in communication. In addition to judging the rigor and propriety of a manuscript's research methods, and the validity and reliability (or plausibility and consistency) of results, reviewers assess the applicability of a manuscript's conclusions and recommendations to the practice and teaching of technical communication. A key issue in their analysis of a manuscript is the

Sam Dragga, Editor

ability to adopt or adapt its findings to the experience of technical communicators on the job or in the classroom. And this decision of the reviewers is obviously subject to the influence of their lived experience.

In this review effort, *Technical Communication* enjoys the privilege of involving scores of specialists from industry and academic institutions. Theirs is a vital contribution to the research of the field as well as to the credibility and readability of this journal:

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# On the Cover

Celebrating Differences

TECHNICAL
COMMUNICATION:
CELEBRATING
DIFFERENCES
AND INCREASING
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Worldwide, the workplace is rapidly diversifying, making it easier for those across various cultural and ethnic backgrounds to connect and communicate. With the advancement of technology and social progression involving equal rights in the workplace, intercultural communication will only increase from here. Rather than having our cultural differences create barriers between us, we must celebrate them and recognize that our differences offer unique perspectives inside the workplace and beyond.

## About the Artist

**Emma Day** is a junior majoring in English, technical and professional writing, and women and gender studies at Eastern Kentucky University. She intends to use the skills she is developing in her courses, especially in visual rhetoric, to focus on the importance of diversifying the universities and companies in which she will work.

# An Analysis of Physical and Rhetorical Characteristics of Videos Used to Promote Technology Projects, on the Kickstarter Crowdfunding Platform

By Aileen Cudmore and Darina M. Slattery

**Abstract**

**Purpose:** This article examines physical and rhetorical characteristics of videos used to promote technology projects on Kickstarter. In this study, successful projects are defined as projects that reached their funding goal; failed projects did not meet their funding goal.

**Method:** Content analysis of 25 successful and 25 failed technology project videos. Cross-cultural analysis of successful U.S. videos and non-U.S. videos.

**Results:**

- Successful project videos were more likely to include iconic and analytic still images and to demonstrate the final product; usually displayed a combination of static and dynamic pictures; and tended to use shorter on-screen texts.
- All videos comprised at least one of the *kairos* subtypes.
- Successful U.S. videos were more likely to present the creator onscreen, include static pictures and provide information on why the creator needed donations (*logos*). These also always referred to timeliness or a call to action (*kairos*).
- Successful non-U.S. videos were much more likely to refer to the exclusivity of the product (*pathos*)

**Conclusion:** Kickstarter project videos are an important feature on the main project page and may influence potential supporters' decisions to fund projects. While other factors can also contribute to project success, an awareness of physical characteristics and rhetorical appeals of successful videos can help project campaigners, technical communication practitioners, and educators create more effective videos.

**Keywords:** crowdfunding, technology project videos, content analysis, rhetorical analysis, physical characteristics of videos

**Practitioner's Takeaway:**

- Videos for technology projects on Kickstarter varied considerably in their physical characteristics and in their use of rhetorical (particularly, *ethos* and *pathos*) appeals.
- The videos for successful (funded) projects differed from those for failed projects, but there were also some similarities.

- Crowdfunding entrepreneurs and video developers can learn how to construct more appealing videos, particularly for technology projects.
- Technical communication practitioners can learn how to develop more engaging and persuasive videos.
- Educators can learn how to develop better instructional videos.

# Crowdfunding Project Videos

## Introduction To Crowdfunding

Entrepreneurial finance, which is funding that is made available to entrepreneurs, has evolved considerably in the last decade. Traditional methods of finance for emerging businesses include investments from friends and family, lending from banks, and venture capitalists (investors who provide funds to small businesses). *Shark Tank,* a reality television series based on *Dragon's Den*, offers opportunities to aspiring entrepreneurs to make business presentations to a panel of potential investors. In more recent years, Web-based crowdfunding has emerged as another possible alternative to traditional models (Cordova et al., 2015; Mollick, 2014).

Crowdfunding rapidly developed after the 2008 financial crisis in response to the increased difficulties faced by early-stage entrepreneurs attempting to raise funds. One such response was President Obama's JOBS Act of 2012, which included a reference to crowdfunding (Cordova et al., 2015). The crowdfunding finance model enables entrepreneurs to acquire investments from the public over the Internet to help develop new projects. In return, supporters (also known as backers) can gain a reward (e.g. meet the artist behind a project or receive sample products), a return on their investment, or a percentage stake in the company. Crowdfunding platforms (such as Kickstarter, IndieGoGo, and RocketHub) facilitate the exchange between project creators and supporters by providing webpages where creators can pitch their project ideas. Proposal types vary considerably—for example, they may be for music tours, book publishing, tabletop games, one-time events (e.g. parties), and even medical expenses (Cordova et al., 2015; Kickstarter, 2018).

Between 2009 and 2018, Kickstarter, a market leader in reward-based crowdfunding, received approximately $3.5 billion in pledges from over $14 million backers for over 138,270 projects (Kickstarter, 2018). While some projects only aim to raise a few dollars, and most successful projects raise less than $10,000, a number of project creators have had enormous success with the crowdfunding model, raising millions of dollars through large quantities of small donations (Kickstarter, 2018). High profile success stories, such as Oculus (virtual reality devices) and Pebble (smartwatches), have increased the popularity of crowdfunding (Mollick, 2016). Table 1 presents details of the most funded projects on Kickstarter.

**Table 1. The most funded projects on Kickstarter**

| Project | Amount Raised (USD) | Category |
|---|---|---|
| Pebble Time | $20,338,986 | Design |
| Coolest Cooler | $13,285,226 | Design |
| Pebble 2 | $12,779,843 | Design |
| Kingdom Death: Monster 1.5 | $12,393,139 | Tabletop Games |
| Pebble: E-Paper Watch | $10,266,845 | Design |

Success in a crowdfunded project is often determined by whether the project reached its funding goal or not. If a project falls short of its funding goal, which may be small or large, none of the backers has to pay his or her pledge. In Kickstarter's (2018) statistics for different project categories, projects related to dance, comics, and music have the highest success rate; however, this rate is calculated by dividing the number of successfully funded projects by the number of all projects that have reached their deadline (including successful, unsuccessful, canceled, and suspended projects). While projects can fail for any number of reasons—including a poor-quality product, a poor 'pitch', and poor timing (*kairos*)—much of the previous research has focused on identifying the factors that contribute to a project's success (Cardon et al., 2009; Gerber & Gui, 2013; Hobbs et al., 2016; Mollick, 2014). One factor that can influence this success is the project or campaign video (Mollick, 2014), which appears at the top of a project page. Creators use these videos to pitch their proposed projects and to highlight the benefits of investing. Consequently, project campaigners should be interested in knowing which physical and rhetorical characteristics make an effective Kickstarter campaign video. These characteristics are also of interest to mass communication and technical communication practitioners who develop videos and to educators who develop instructional videos for students.

## Characteristics of Crowdfunding Project Campaign Videos

A crowdfunding campaign video is simply a visual pitch of the campaign that informs viewers (potential project backers) about the crowdfunding project. However, due to the online setting of crowdfunding, a video can be

Aileen Cudmore and Darina M. Slattery

one of the most effective ways to convey information about a project. Videos can potentially engage supporters in a more dynamic way than just a textual project description, as they can enable creators to appeal directly to their audience, express their passion, and emphasize why the project must be fulfilled (Steinberg & DeMaria, 2012).

On Kickstarter, videos have a prominent position at the top of every project campaign page (see Figure 1). Kickstarter outlines some very general tips for making a video (Benovic, 2016; O'Connell & Kurtz, 2012) and provides a dedicated discussion forum where project creators can find advice from their peers (Kickstarter, 2017a).

Several studies suggest that the use of video is an important variable affecting crowdfunding success. Frydrych, Bock, Kinder, and Koeck (2014) found that 87% of Kickstarter projects incorporated a video on the campaign page. Marelli and Ordanini (2016) found that crowdfunding campaigns with a video had a higher probability of achieving successful funding. Similarly, another study found that those projects with

a video tended to perform better than those without (Lindroos, 2016).

However, simply having a video is not necessarily an indicator of success. One study suggested that the presence of a video has become standard, with the majority of successful and failed projects in that research containing a video (Frydrych et al., 2014). Similar results were found by Carlsen and Høgh (2016), with 98% of successful and 81% of failed campaigns providing a video. Furthermore, a crowdfunding campaign can still be highly successful without a video (Young, 2013). Nevertheless, it is likely that the content of successful and failed videos differ, and that these differences may influence potential backers' decisions to fund projects.

Although the characteristics of online videos have been studied previously (see, e.g., Dowhal et al., 1993; ten Hove & van de Meij, 2015), little is known about the factors that make crowdfunding campaign videos engaging. Many recommendations are based on personal observations and experiences, rather than solid academic research (Steinberg & DeMaria, 2012).
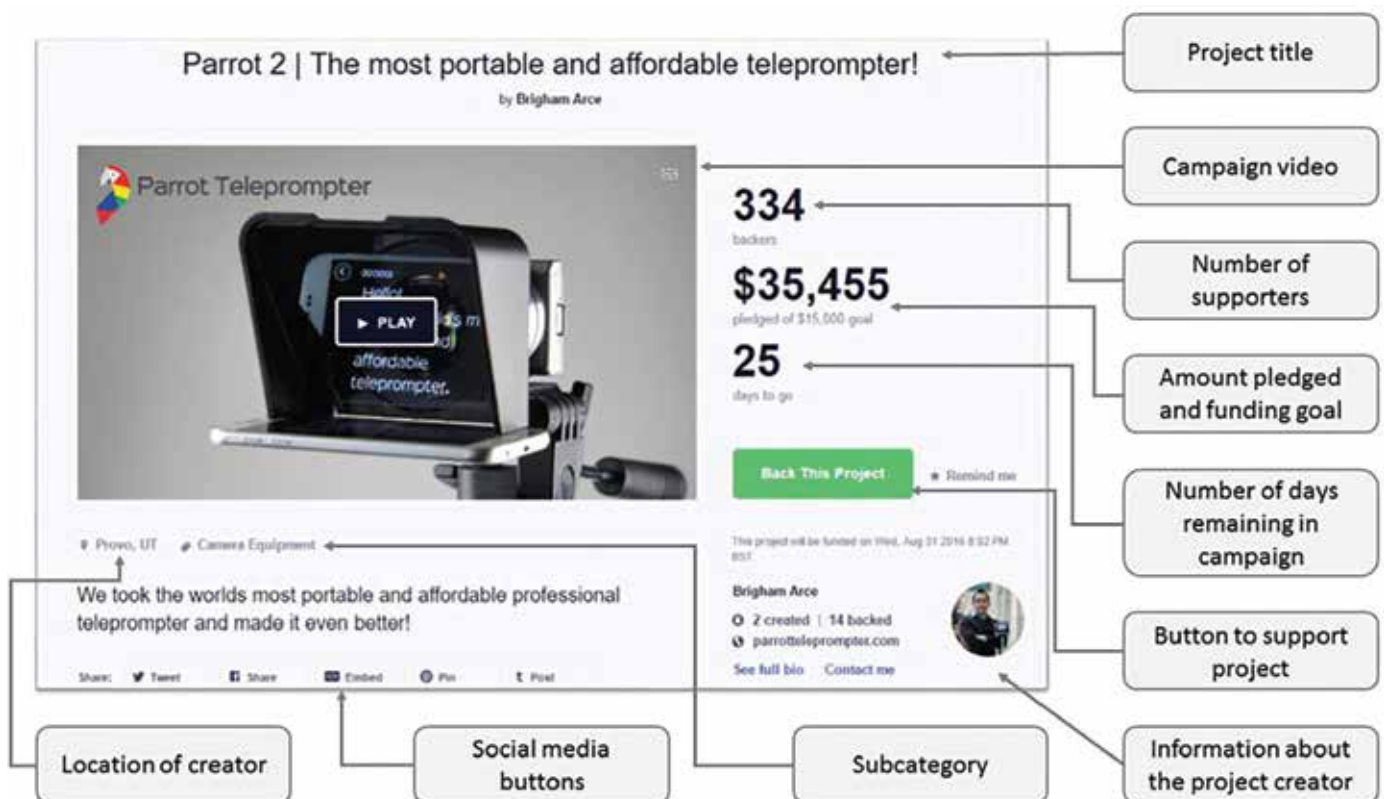


**Figure 1. Example of a Kickstarter campaign page as viewed on a Web browser**

# Crowdfunding Project Videos

One study suggested that persuasiveness, humor, and multimedia can affect people's opinion toward online videos (Hsieh, Hsieh, & Tang, 2012). Recent findings from Kaminski, Jiang, Piller, and Hopp (2017) suggested the Kickstarter video pitches from 'lead user' entrepreneurs—entrepreneurs who "sense needs long before they become known to the broader public" (p. 2683)—are more orientated toward the product and problem solving. Hobbs, Grigore, and Molesworth (2016) suggested successful videos show evidence of passion (e.g. showing visual cues in the pitch video or evidence of time invested) and preparedness (e.g. displaying a level of detail within pitch documents).

As the creators often decide on the content of the video, it is likely that the features of the video will vary from project to project (Reyes & Bahm, 2016). However, it is possible to evaluate certain aspects of the physical design of video, such as the timing and production quality. Similarly, the persuasive nature of the video can be assessed by examining the type of rhetorical appeals used in the accompanying narration. We will discuss some literature relating to physical characteristics and rhetorical appeals in the next section. It is worth noting that even if a video generates positive feedback from viewers, this feedback is not necessarily enough to guarantee that a project will be successful. For example, in a focus group study about one successful and one unsuccessful music project, the interviewees did not consider either project worthy of support, based on the video alone, even though the interviewees identified many positive features in the videos (Byg-Fabritius & Willumsen, 2013). In that study, the interviewees cited other reasons why they would not back either project, which included the way the music artist attempted to secure funds (they did not like being "guilt-tripped" into supporting the cause) and they argued that they (the music artists) were famous enough to secure funding elsewhere.

## Physical Characteristics

Online videos—which might be viewed on desktops, tablet PCs, or smart devices—have many features that may determine their overall quality. Several recent studies have investigated the characteristics of online videos. ten Hove and van der Meij (2015) identified physical characteristics that distinguished popular instructional videos on YouTube from unpopular ones; these characteristics related to resolution, visuals, verbal

and sound, and tempo. Other research developed best practice advice for creating online instructional videos, highlighting the importance of video and audio production quality. For example, Swarts (2012) found the use of quality voice-overs and planned, scripted, and edited videos contributed to the overall production quality; likewise, the use of professional screencasting software can also improve the quality. Swarts also identified specific features of "good" videos, which included significant time introducing the instructional agenda and the demonstration and explanation of steps. Good instructional videos are also easy to locate, understand, and use, and they are engaging and reassuring (ibid).

Some studies have examined the benefits of using instructional animations, videos, and static pictures (see, e.g., Arguel & Jamet, 2009; Höffler & Leutner, 2007). Ploetzner and Lowe (2012) distinguished five significant characteristics in the physical design of animated videos used for instructional purposes. They confined their study to animations that are computer-based, have an expository purpose, are artificially created using drawings or models, imitate processes to be learned, and are pre-authored to help learners understand an entity, structure, or process.

Having reviewed several studies, the following physical characteristics appear to be the most important for online videos:

- **Resolution:** The spatial resolution refers to the number of pixels displayed on a screen object and is normally written as 'width x height.' Screens with a large number of pixels are important for showing sharp images and distinguishing details. Related to resolution is the display aspect ratio, which is the proportional relationship between the width and height of a screen object. Swarts (2012) recommended High Definition (HD) or near-HD. In a recent study, the most popular YouTube instructional videos were produced in High Definition (HD) quality (ten Hove & van der Meij, 2015).
- **Visuals:** Visuals refer to all the pictorial information in the video, such as whether still (static) or moving (dynamic) images are used (Ploetzner & Lowe, 2012; ten Hove & van der Meij, 2015). Static images can "emphasize detail by holding it in place" (Swarts, 2012, p. 203). Arguel and Jamet (2009) found that the best learning scores were found

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when video was used with static pictures. Another distinction is between real (or realistic) and abstract (or illustrated) visuals (ten Hove & van der Meij, 2015). ten Hove and van der Meij found that analytic static pictures (illustrations that symbolize objects or states rather than real objects) appeared more often in popular YouTube videos but there were no significant differences in types of dynamic images, whether they were real-time images (e.g., video) or animations.

- **Audio:** Audio refers to the presence of music, spoken words, or any other sounds in the video. Spoken words may include speech from an onscreen presenter and narration from a presenter off-screen. Audio can be used to signal a change in topic and to give the eyes a rest (Swarts, 2012). Narration is found more in popular YouTube videos than in unpopular videos (ten Hove & van der Meij, 2015).

- **Onscreen texts:** Onscreen texts represent any written words that appear onscreen, with the exception of the title (ten Hove & van der Meij, 2015). Some campaign videos have no spoken words and, instead, convey all their information through written texts onscreen. The onscreen texts category also includes the presence of subtitles. Text can be used to clarify video and to organize the video (Swarts, 2012). ten Hove and van der Meij found that popular instructional videos on YouTube comprised onscreen text more than unpopular ones. They also recommended the use of video transcripts.

- **Tempo:** Tempo describes the pace of the video, including the length, frame rate, and narrative speed. Previous studies suggested that the length of campaign videos should be no longer than three minutes (Drabløs, 2015), but no study has yet shown if campaign creators actually adhere to this guideline. Narrative speed is also important—the narration should be normal and consistent in its pacing, and synchronized to the visual action in the video (Swarts, 2012). The ten Hove and van der Meij (2015) study found the most popular instructional videos on YouTube had an average narrative speed of 172 words per minute (wpm), which is a good deal faster than the average U.S. speaker rate of 150wpm (National Center for Voice and Speech, n.d.).

- **Branding:** Branding includes the presence of the product or company logo on the screen. It is an important persuasive tool, as prominent placements are likely to improve viewers' memories of the product (Cowley & Barron, 2008). Footage of the proposed project or final product helps to build confidence in the creator's abilities (Cardon, Wincent, Singh, & Drnovsek, 2009).

## Rhetorical Appeals

The ultimate intent of a crowdfunding campaign video is to promote the creator's project and to persuade potential supporters to fund the project. Decades of research show a message's ability to persuade is determined by the characteristics of the communicator, the message, and the audience (Lasswell, 1948).

Previous studies have examined audience characteristics in the context of reward-based crowdfunding, in which the audience (potential funders) is motivated to support the creators by the promise of some kind of reward (Mollick, 2014). For the most part, the audience members are not professional investors and often include individuals who have a personal link (family or friend) to the project creator (Agrawal et al., 2010). Alternatively, the funders may be treated as early customers, and, by supporting the project, they gain access to the product at an earlier date, at a better price, or with some other special benefit. However, the individual motivations of funders are often complex and highly variable. In a series of interviews with supporters, Gerber and Hui (2013) found funders were motivated by a desire to gain rewards, help others, support causes, and be part of a community. Nonetheless, studies have shown most funders respond to signals about the quality of the project, regardless of other factors (Courtney et al., 2017; Koch & Siering, 2015; Marelli & Ordanini, 2016). Because it is difficult for crowdfunding project creators to control audience characteristics (e.g., their demographics, preferences, and beliefs), our study focuses on the communicator and message factors of videos, rather than the audience.

According to Aristotle's means of persuasion, the communicator's characteristics comprise *ethos* appeals, while the message characteristics include *logos* and *pathos* appeals (Meyer, 2012). These three rhetorical appeals are some of the most effective ways of investigating the persuasive nature of communication (Tirdatov, 2014):

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- *Ethos* refers to the credibility of the communicator. In terms of campaign videos, the creator's characteristics and trustworthiness should influence the degree to which the viewers find the campaign credible and persuasive (Hovland & Weiss, 1951). Online, creators can convey their *ethos* by demonstrating their competence and professional affiliations (Tirdatov, 2014). These strategies may improve the attitudes of potential supporters toward the crowdfunding project (English, Sweetser, & Ancu, 2011).
- *Pathos* refers to the use of emotional appeals, which can influence the attractiveness of online videos by evoking a positive or negative emotional response in the viewer (Hsieh et al., 2012). In particular, positive feelings, such as joy and humor, may help to increase the popularity of a video (Elliott, 2013).
- Using a logical approach, or *logos*, a project creator provides factual information to support the claims he or she makes in the campaign video and to prove that the project is worth funding. For example, the project creator might give a list of specifications for a new device or product. The logical approach enables potential backers to evaluate the project based on that information.

Due to the novelty of the online crowdfunding concept, prior research related to the rhetoric of campaign videos is scarce. Nonetheless, the related field of traditional fundraising often uses rhetorical appeals to secure donations (Ritzenhein, 1998). Appeals are also effective online and can greatly improve the rate of recruitment in digital surveys (Rife, 2010). Furthermore, studies have recommended rhetorical appeals play a central role in marketing and advertising (Marsh, 2007; Tonks, 2002).

Most previous research on the rhetoric of online videos has investigated political campaigns and promotions. One study found YouTube videos in favor of a new piece of legislation used mainly *pathos* appeals (e.g., emotion), while those against incorporated more *logos* appeals (e.g., factual information) (Krause, Meyers, Irlbeck, & Chambers, 2015). In a study of political user-generated videos from Singapore, the most popular videos usually relied on strong emotional appeals (Lin, 2015). An analysis of campaign videos for non-governmental organizations found they typically use either persuasive rhetoric, with the presenter speaking in the first person about non-specific, complex information, or *logos* appeals, with the presenter speaking in the third person about specific, simple information (Almaraz, González, & Van-Wyck, 2013).

One recent study used Aristotle's concepts of *ethos*, *pathos*, and *logos* to develop a framework to classify the rhetorical means of persuasion used in the *textual descriptions* of Kickstarter projects (Tirdatov, 2014). Tirdatov found the most-funded projects contained all three types of rhetorical appeals, and these appeals could be subdivided into specific subtypes.

Another rhetorical appeal that is likely to be relevant is *kairos*, or timeliness. In terms of crowdfunding campaigns, *kairos* might refer to a call to action or timely opportunity to support a project (e.g., "Avail of this one-off opportunity to invest in . . .") or an opportunity to avail of a timely solution to a particular need (e.g., "This is the only product in the market right now that can . . ."). *Kairos* might also refer to the inclusion of a deadline or goals. In her study of the successful administration of online surveys, Rife (2010) proposed *kairos* might even surpass *ethos*, *pathos*, and *logos* as a rhetorical strategy "because no matter how perfect the ethos, no matter how strong the pathos, and no matter how logical the argument, if the timing is wrong, the audience will not listen" (p. 262).

Our study uses the *ethos*, *pathos*, and *logos* appeals and subtypes identified by Tirdatov (2014), as well as two *kairos* subtypes, as a basis to investigate the rhetorical appeals in Kickstarter campaign videos. We will discuss these appeals and subtypes in the results and discussion section.

## Methodology

In our study, the goal was to analyze the characteristics of campaign videos for technology projects on Kickstarter, a popular online crowdfunding platform (Young, 2013). The aspects of campaign videos we investigated relate to the physical characteristics of the video and rhetorical appeals used in the accompanying spoken narration. In this study, we define a successful campaign video as one that reached its funding goal and a failed campaign video as one that did not reach its funding goal. If a project falls short of its funding goal, none of the backers has to pay his or her pledge.

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## Research Questions

We conducted a content analysis on the campaign videos from Kickstarter technology projects, with a view to answering the following research questions:

1. To what extent do successful Kickstarter campaign videos for technology projects differ from failed videos in their physical characteristics?
2. To what extent do successful Kickstarter campaign videos for technology projects differ from failed videos in the rhetorical appeals that they use in their spoken narration?
3. To what extent do successful U.S. videos differ from successful non-U.S. videos in their physical characteristics?
4. To what extent do successful U.S. videos differ from successful non-U.S. videos in the rhetorical appeals that they use in their spoken narration?

## Our Approach

In our study, we adopted an empirical research approach, which uses the scientific method (Hughes & Hayhoe, 2008). The advantage of empirical research is that it is relatively objective, as it uses quantifiable observations to form the results. However, the focus of the research is narrow, and any findings are constrained by the original research question(s).

We used a content analysis to evaluate the campaign videos. Although content analysis is traditionally associated with written documents, it also includes non-written documents such as video (MacNealy, 1999). The traditional approach to content analysis is quantitative and involves measuring the number and type of categories present in a document (Neuendorf, 2002).

We also used qualitative content analysis to select illustrative examples from the videos to explore the main findings. Such qualitative analysis helps to support quantitative studies, which, on their own, might be misleading (Nielsen, 2004).

## Video sampling

We evaluated campaign videos filed under the technology category on Kickstarter. The technology category includes a diverse set of products and services, including apps, 3D printing equipment, robotic devices, and software. We selected the videos for this research through a series of seven steps, which reduced the original pool of videos to a final sample of 50 (see Figure 2).

These steps were:



**Figure 2. Data manipulation steps, showing the total number of successful and failed projects in each step**

- **Step 1: Raw data.** The raw dataset contained the 106,943 successful and 190,538 failed campaigns that launched on Kickstarter from April 2009 to June 2016.
- **Step 2: Technology projects.** We excluded all campaigns that were not in the technology category from the dataset. As of June 6, 2016, Kickstarter had launched 4,409 successful and 18,029 failed projects in the technology category.
- **Step 3: Time period.** We limited the selection of videos to campaigns that ran from January 1, 2016 to March 31, 2016. Given that these were technology projects, selecting (then) recent projects ensured that any findings were as current to the literature as possible. Step 3 provided a sample of 191 successful and 752 failed projects.
- **Step 4: Video content.** Of the failed projects, 328 did not include any type of campaign video. We excluded these projects from the dataset, leaving 424 failed projects in the sample. Every successful campaign comprised a video, so there was no further filtering in this step.
- **Step 5: First-time creators.** We only included projects produced by first-time creators in the dataset. Creators who had previously created a successful project can build upon a pre-existing audience (Mollick, 2014). Prior success gives creators a considerable advantage over first-time creators and may act as a confounding factor in the

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analysis. Step 5 reduced the number of successful projects to 133 and failed projects to 370.

- **Step 6: Funding level.** For the failed projects, we also excluded those that received no donations. Step 6 ensured that only those with potential backers were included in the study and reduced the number of failed projects in the database to 337.

- **Step 7: Random selection of videos for detailed analysis.** We used a random sampling method to select the final 25 successful projects and 25 failed projects to examine in detail. We chose 50 projects, as it represents just over 10% of the pool remaining (i.e., 133 successful and 337 failed projects). First, we ranked all projects in order of the percentage-funding goal reached. Then, we selected 25 projects from each of the successful and failed ranks using the random integer set generator from RANDOM. ORG (Randomness and Integrity Services Ltd., 2016). Step 7 provided us with 50 videos (25 successful and 25 failed) for further analysis (see Appendix A). We downloaded these videos and saved them as mp4 files.

## Codebooks

We then developed codebooks, which describe how we coded (tagged) and scored a video based on its external properties, physical characteristics, and rhetorical appeals. We developed the codebooks to ensure consistency and to enable other researchers to replicate our study. The codebooks are available in Appendices B through D. Prior to the collection of the research data, we conducted pilot coding to test the codebooks. As a result, we made several revisions, which helped to improve the reliability of the coding scheme (Neuendorf, 2002):

- **External properties:** These properties included descriptive data, which are important for locating and identifying a video. Kickstarter presents this data on the campaign page of every project. We gave each video a unique ID code, numbered from 101–150 (see Appendix B). The descriptive data included the URL, title, and currency. In addition, we included statistical data about the project, such as the campaign start and duration, funding goal, final amount raised, and total number of backers.

- **Physical characteristics:** We developed a codebook for physical characteristics based on the framework used by ten Hove and van der Meij

(2015). The codebook included 27 items divided into six main categories: resolution, visuals, audio, onscreen texts, branding, and tempo (see Appendix C). We assigned these items to one of two mutually exclusive classes: absent (0) and present (1), and recorded continuous data as their actual values. These included the frame rate, video length, and narrative speed, which we estimated by counting the average number of words spoken per minute by the narrator.

- **Rhetorical appeals:** We also assessed the videos for the rhetorical appeals they use in the accompanying narration. We developed a framework for assessing verbal rhetorical appeals based on findings from Tirdatov (2014). The Tirdatov framework consisted of 11 subtypes divided into three main types of appeal: *ethos*, *pathos*, and *logos*. We also identified two *kairos* appeals that are relevant to crowdfunding videos. The codebook provides a detailed description and illustration for coding and scoring each of these subtypes (see Appendix D).

In order to code the rhetorical subtypes, we first transcribed the narration that accompanied each video and saved the script as a .txt file. Then, we coded the text using categories that denoted the 13 subtypes of rhetorical appeals. We carried out all coding in Weft QDA (Fenton, 2014). Next, we recorded the presence (1) or absence (0) for each of these subtypes in each video. If a single sentence contained more than one rhetorical appeal, we counted it as one example of each of the individual subtypes identified within that sentence.

## Data Analysis

We recorded all information relating to external properties, physical characteristics, and rhetorical techniques in separate Excel files. Because five successful (20%) and seven failed (28%) videos did not contain any spoken narration, we did not code these twelve videos for rhetorical appeals and excluded these videos from the final rhetorical analysis.

We expressed the results of the nominal data as percentage frequencies of the total number of videos analyzed. For continuous data, we calculated the average result of successful and failed videos, or the median value if the variables were non-normal.

We analyzed the data by comparing successful and failed results for each of the variables. Most of the

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data were nominal variables, with each item classified as being either present or absent from a video. These data were analyzed using 2-way Chi-squared ($\chi^2$) tests. If the data did not meet the conditions of the Chi-squared test because of low expected frequencies, we analyzed them using the Fisher Exact Probability test. We analyzed the continuous variables using an unpaired t-test (for normal data), or Mann-Whitney U-test (for non-normal data). We completed all analyses in Microsoft Excel.

## Results and Discussion

Here, we present the findings of the external properties of the sampled videos, an overview of the physical characteristics, followed by an overview of the rhetorical appeals of the language used in the videos. In a brief case study, we also outline the characteristics and appeals used in one successful and one failed video. Finally, we present the findings from a cross-cultural analysis of physical characteristics and rhetorical appeals in the successful U.S. and successful non-U.S. videos.

### Description of the Sampled Videos
As outlined earlier, we examined 25 successful and 25 failed campaign videos for technology projects on Kickstarter. All campaigns were from first-time creators and ran from January to March 2016.

These projects sought funds for a diverse set of technology offerings, including apps, 3D printing equipment, robotic devices, and software. The projects raised funds in eight different currencies, the most popular of which were the U.S. Dollar (38%), Euro (22%), and British Pound (20%). None of the currencies was significantly associated with either successful or failed campaigns.

As expected, successful projects raised significantly more funds than failed ones (t=1.68; $P<0.001$). The most successful project in this study, ChameleonMini, raised €190,519 (approximately $215,000 USD). Similarly, successful projects reached a significantly higher percentage of their original funding goal (Mann-Whitney U-test, U=0; $n_1$=25, $n_2$=25; $P<0.01$) and received funds from significantly more people than failed projects did (Mann-Whitney U-test, U=18; $n_1$=25, $n_2$=25; $P<0.01$). The most popular project gained the support of 1,778 people, whereas only one person supported the least popular project.

Some studies suggest that campaigns fail because they choose unreasonable funding targets (Frydrych et al., 2014). The funding goal of successful and failed projects in this study ranged from as little as $1,473 USD to as much as $346,670 USD, with a standard deviation of ± $7,352.60 USD. The average funding goal ($30,258 USD) is comparable with the levels of funding from financial institutions (Mollick, 2014) and suggests most project creators are serious about raising money.

Similarly, previous studies have suggested failed campaigns set overly long campaigns, which can hinder their overall success (Marelli & Ordanini, 2016). However, most projects in this study set campaign durations of around 30 days, which is similar to the project length suggested by Kickstarter (Strickler, 2011). These results indicate first-time creators incorporate basic advice on crowdfunding that is available to them.

### Physical Characteristics
Appendix C presents the codebook used to record the physical characteristics (resolution, visuals, audio, onscreen texts, branding, and tempo) of Kickstarter videos. Our analysis of these physical characteristics reveals most videos, both successful and failed, incorporated some similar characteristics, including relatively good production quality, relatively clear audio (narration, music, sound, and noise), and a 16:9 screen aspect ratio. Other commonly used features included realistic dynamic pictures and branding logos. The majority of successful and failed videos also adhered to Kickstarter's recommended video length (no longer than three to five minutes) and lasted, on average, 2 minutes and 30 seconds. However, as several characteristics were significantly associated only with successful videos, it is possible that these subtler aspects were responsible for engaging viewers and compelling them to action (Morain & Swarts, 2012). The next section will discuss those distinct characteristics. Later in this article, we will analyze characteristics of one successful and one failed video, with the aid of screenshots.

### Distinct successful characteristics
One of the main distinguishing factors of successful videos is in their use of a *combination of visual materials* (e.g., colored and black and white images, dynamic and static images, and animations), but, particularly, the inclusion of static images. In many of the successful

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videos, static or still images were used to focus on the details of the product. Such images can be a powerful tool for processing information (Arguel & Jamet, 2009; Smith & Ragan, 1999). Using a combination of visuals helps to keep viewers engaged and motivated (Alexander, 2013). While many project campaigners recognized the importance of using a logo to express a visual identity—logos appeared in 19 successful (76%) and 15 failed videos (60%)—a logo alone does not appear to be enough to persuade viewers to support a campaign. Unlike failed videos, which tended to show prototypes (n=17, 68%) more often than the final product (n=10, 40%), the majority of successful videos (n=19, 76%) demonstrated the final product onscreen. Such actions help to make the project more memorable for viewers (Cowley & Barron, 2008) and demonstrate tangible proof that the creator will be able to complete the project.

On a related note, Fernandes (2013) found when visually stimulating videos are used, the creator appears to be more capable and the success rate of the project is likely to be higher. Nielsen (2005) found many viewers are bored by videos that only show the presenter speaking straight to the camera—interestingly, this kind of presentation was a feature of several failed videos. Finally, many successful videos clearly linked the visuals with the *narration*, which helped to make the video more understandable (Plaisant & Shneiderman, 2005).

The majority of successful videos included some *onscreen text*, usually in the form of short texts. These short texts usually took the form of labels, titles, or short phrases that introduced the creator (e.g., "I'm Craig Leaf, founder of Appostasy"). The use of short texts in combination with the narrative and visuals helps to identify technical features and to create a memorable image (Clark & Mayer, 2008; Ploetzner & Lowe, 2012). In contrast, long texts were more likely to occur in failed videos. These texts generally came in the form of slides or written messages, and usually carried the main message of the video. However, most research advises creators to reduce onscreen text, as it takes longer for viewers to process (Clark & Mayer, 2008). Thus, videos with lengthy text are more likely to be unappealing and less persuasive to viewers.

In terms of *audio*, there was a trend for successful videos to have the creator of the campaign present some information onscreen. Many previous studies show such personalization is important for videos (Guo et al.,

2014; van der Meij & van der Meij, 2013). Furthermore, narration can often enhance visuals (Atlas, Cornett, Lane, & Napier, 1997) and enables the viewer to retain more information than he or she would retain from either medium on its own (Rieber, 2000). In the 20 successful videos that contained narration, the narration speed ranged from 93wpm to 166wpm. In the 18 failed videos that contained narration, the speed ranged from 94wpm to 203wpm. While the average speed for successful videos (140wpm) was slower than the average speed for failed videos (144wpm), both average narrative speeds were still lower than the average U.S. speaker rate of 150wpm (National Center for Voice and Speech, n.d.) and the most popular YouTube instructional videos analyzed in the ten Hove and van der Meij (2015) study (172wpm), suggesting that crowdfunding video narration may be slower than average.

Our findings suggest successful project creators may take more time and effort when developing their videos, as there are some specific characteristics that are associated more with successful videos. Potential backers may view the quality of these videos as a signal of quality for the whole campaign (Chen, Yao, & Kotha, 2009; Mollick, 2014).

## Rhetorical Appeals

We also analyzed the rhetorical appeals used in *spoken narration* in successful (n=20) and failed (n=18) campaign videos, focusing on common appeals, distinct successful appeals, and rare appeals. Appendix D presents the codebook used to record the rhetorical appeals (*ethos*, *pathos*, *logos*, and *kairos*) and defines the 13 subtypes. There was a significant difference in the average number of subtype appeals per video, with successful videos (9 ± 1.4) using significantly more subtype appeals in narration (Mann-Whitney U-test, U=44; $n_1$=20, $n_2$=18; p<0.05) than failed videos (6 ± 1.6).

Our analysis of Tirdatov's (2014) rhetorical characteristics reveals that the appeal subtypes common to most successful and failed videos are L5, L1, and P2 (see Appendix D). Of the videos comprising spoken narration, 90% of successful (n=18) and 94% (n=17) of failed videos began with some form of L5 appeal subtype. An L5 subtype provides *general data and background information* about the project. Many videos used this technique to describe the problem that the crowdfunding project will solve. After the L5 appeal, there was usually some kind of outline of the *actual features*

*and characteristics* of the product (L1 subtype), which occurred in 95% of successful (n=19) and 94% of failed videos (n=17). Finally, in 100% of successful (n=20) and 83% of failed videos (n=15), there was some reference to the *positive, emotionally rewarding implications* of supporting the project (P2 subtype). By claiming to solve certain problems, the videos implied the projects would, ultimately, have a positive impact on supporters' lives. Together, these three basic appeal subtypes reflect the qualities that make solid written proposals: a definition of a problem or opportunity and a detailed plan to respond to the problem (Markel, 2012).

In terms of *kairos* appeals, contextual information on why the project *fulfills a need* for the current situation (K1 subtype) occurred in 80% of successful videos (n=16) with spoken narration but only in 56% of failed videos (n=10). However, *references to timeliness or a call to action to support the project* (K2 subtype) occurred in 85% of successful (n=17) and in 89% of failed videos with spoken narration (n=16). The frequency of the K2 subtype appeal is not surprising, however, given that Kickstarter campaigns tend to feature new and innovative projects, and campaigners need to create a sense of urgency if they are to meet their funding goals by the deadline.

### Distinct successful appeals

Appeal subtypes that distinguished successful videos from failed ones were E1, P1, P3, and often L2 (see Appendix D). The E1 subtype, which makes an *implicit claim about the credibility of project owners* by demonstrating professionalism and expertise, occurred more frequently in successful videos, which suggests *ethos* plays an important role in reassuring potential supporters that the project will be successful. Previous research also suggests such confidence-building claims are a feature of good online videos, while poor videos seldom contain such claims (Morain & Swarts, 2012). Another study confirms this finding by indicating that *ethos* is the most important appeal in YouTube political videos (English et al., 2011).

Since 95% of successful videos with spoken narration (n=19) included two or more *pathos* subtypes, compared with 56% of failed videos (n=10), this finding points to the usefulness of incorporating emotional narrative techniques in campaign videos. However, these subtypes do not specify the type of emotion that should be used. Advice from online forums suggests that

creators should use humor in their videos (Kickstarter, 2017b). However, in the videos we analyzed, the *pathos* evidence frequently related to *enthusiasm* for the project, through the use of words such as "awesome" and "passionate" (P1 subtype). Most videos possibly avoided humor, because it can lower the credibility of the project if not used well (English et al., 2011). P3 subtype claims relating to *exclusivity* are also important as they can generate a positive emotional perception of the project. Research shows that people generally attach more value to products that are rare, distinct, or available for a limited time (Mitra & Gilbert, 2014).

Finally, L2 subtypes, which provide information on the *benefits and rewards* that the project offers to supporters, were also associated with successful projects. The L2 subtype has a similar aim to the P2 subtype (the positive, emotionally rewarding implications), but lacks the emotional language of the P2 subtype. In cases where the L2 subtype was missing, the objective was possibly met by the P2 subtype.

### Rare appeals

Several appeal subtypes were rare in both successful and failed videos, including E2, E3, L3, and L4. In terms of the E2 subtype, the videos rarely referred to the *involvement of a famous person, organization, or product* in the project. Such appeals may be more likely to occur in creative projects, such as those for music, dance, or film, where the project owner may be a famous screenwriter, musician, or established author (Tirdatov, 2014).

In terms of E3 appeals; which are concerned with *references to third-party recommendations, reviews, or testimonials*; if creators had third-party reviews, they tended to include them in the textual description on the project page, rather than in the videos, as they could include a list of the sources with hyperlinks to full reviews on external websites. Sometimes, further down the campaign page, the creators included additional YouTube videos of reviews and testimonials from third parties.

Similarly, L3 subtypes (*information on financial terms*) did not appear to be an important subtype for these campaign videos. The basic funding mechanism operates very much the same way on all Kickstarter projects (i.e., projects that fail to reach the funding goal are cancelled and people who pledge to back the project are not charged), which is probably why most video creators choose not to spend time repeating those terms.

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Rather, this information is probably best suited to a textual description elsewhere on the campaign page.

The L4 subtype, which provides information on *why exactly the creators need donations and how creators will use donations*, was rarely used. It is possible that there was insufficient time to elaborate on this information in the videos and/or it was better suited to a textual description on the campaign page.

## A Case Study of a Successful and Failed Video

In this section, we will discuss physical and rhetorical characteristics of one successful video and one failed video.

### A successful video

There are a number of campaign videos that correspond strikingly well with the average characteristics of a successful video. One of these is for a project called "PenSe: Apple Pencil Case. Make the world your canvas" (Project 115, see Appendix A). The PenSe campaign was created by a company called Appostasy Inc. and ran from January 27 to February 26, 2016 (30 days). Six hundred and sixty-one backers pledged $38,076 of the $32,000 goal to fund the project.

The video for this project has a high production quality and uses a 16:9 aspect ratio. It has a frame rate of 30 frames per second and is composed of a combination of dynamic and static pictures. In addition, the audio is free of extraneous noise and the video is free of blurred visuals. The total length of the video is 3 minutes and 6 seconds.

The video begins with an off-screen narrator *describing a problem* (L5 subtype) with a new pen for Apple iPads, which is shown in a series of static pictures while gentle music plays in the background (see Figure 3a). The introduction arouses curiosity in viewers with an interest in Apple products. The narrator illustrates the solution to the problem by *describing the product* that the company has developed (L1 subtype), while the final product is displayed onscreen (see Figure 3b). The narrator uses words with an *emotional narrative* ('safe', 'simple', and 'elegant') (P1 subtype) and highlights the *exclusivity* of the product ('the first pencase') (P3 subtype).

The narrator then *introduces himself* onscreen (E1 subtype), providing a personal link to the creative team (see Figure 3c). At the same time, onscreen text displays his name and position at the company

('Craig Leaf, founder of Appostasy'), as well as the company logo. The creator also uses this introduction as an opportunity to reference his previous experience in creating similar products (E1 subtype). The video concludes with the presenter making an appeal for funding ('to begin production, we need your help') (see Figure 3d). He references the *positive implications* (L2 subtype) of supporting the project ('a superior product,' 'affordable price,' and 'right here in Massachusetts'), and the screen shows a final large shot of the product logo.

### A failed video

Since 32% of failed videos were for an app (compared with just 8% of successful videos), we will use one of these videos as an example of a failed video. The campaign "TetherMe App" was created by AstroApps.com and ran from January 25 to February 15, 2016 (20 days) (Project 140, see Appendix A). Six backers raised $61 (NZD) for the project, out of a goal of $4,500 (NZD).

The video does not follow the structure of the successful PenSe video shown in Figures 3a–3d. Firstly, the length of the video is shorter than average at 49 seconds long (versus 3 minutes and 6 seconds for the successful PenSe video). In terms of rhetorical appeals, it reveals no information about the creators behind the project (unlike the successful video), which in turn makes it appear more like an advertisement than a project campaign video. The information is presented entirely by an off-screen narrator who does not appear to be the creator of the project, and the viewer never sees the creator onscreen. The narrator speaks relatively quickly, at 165 words per minute (wpm); according to the National Center for Voice and Speech (n.d.), the average rate of speech for English speakers in the US is about 150wpm. Although the video uses dynamic pictures throughout, it relies entirely on animations and fails to present any realistic images, unlike the successful video, which shows static images of the finished product. The biggest problem with the video, however, is that it never shows viewers what the app will actually look like on their Apple Watch. Nonetheless, this video shares some characteristics with the successful video; for example, the production quality of the video is good, is presented in a 16:9 aspect, has a frame rate of 30 frames per second, and the audio is free of extraneous noise. In addition, music plays unobtrusively in the background, and it shows a logo for the product.

**Figure 3a. Problem statement**

**Narration**
This is Apple's newest product: Pencil. A stylus hailed for its delicate precision, it may write like a real pencil, but you wouldn't want to subject this 100-dollar plastic stylus to the same daily wear and tear. Pencil is so new that there are no smart accessories to protect or personalize.

**Timing**
0.02–0.21 (19 seconds)



**Figure 3b. Product description**

**Narration**
So we created PenSe: the first pencase for Apple Pencil. PenSe keeps Pencil and all the little pieces that come with it safe in one simple and elegant case, taking Pencil a step further, adding functionality and protection.

**Timing**
0.22–0.41 (19 seconds)



**Figure 3c. Creator introduction**

**Narration**
Hi, I'm Craig Leaf, founder of Appostasy. I develop smart applications and accessories for Apple products. […] But when Apple Pencil came out, I saw the opportunity to make something new. I teamed up with former TarDisk engineer Ted Sirota and together we developed PenSe.

**Timing**
1.19–1.47 (28 seconds)



**Figure 3d. Appeal for funds**

**Narration**
We're ready to start making PenSe right here in America. We have a long-standing relationship with a local manufacturer, but to begin production we need your help. The project will require custom tooling and an initial production run - no less than 1,000 units. Help us make a superior product at an affordable price right here in Massachusetts.

**Timing**
2.40–3.06 (26 seconds)

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The script of the video lacks many of the rhetorical appeals that appear in more successful videos, such as E1 (reference to prof*essional expertise, practical experience, or prior success*), P1 (the use of *descriptive terms with an emotional narrative*), P3 (a reference to *claims of exclusivity*), and L2 (information on the *practical benefits of making donations*). Like most videos, it provides some *background information* (L5 subtype) on a problem that the product claims to solve ('forget to grab their MacBook and iPhone') (see Figure 4a), and then mentions the *features of the product* (L1 subtype) that will help to solve this problem ('she gets an alert') (see Figure 4b). However, it neglects many of the other subtypes and lacks an *ethos* appeal. The viewer has no

evidence that the company behind the product has had any prior success with other apps. Furthermore, very little reference is made to any of the *pathos* appeal subtypes. It does not claim to be a new or innovative product, and the closest that it comes to an emotional description is when the narrator claims that TetherMe is "an app you can't leave behind." Finally, it makes no direct appeal for funds but, instead, refers to its availability in the App Store (see Figure 4c). It is unclear why the project needs finance from crowdfunding, if it will soon be available to download. Several other failed videos end with a similar appeal to "download now" (Project 137, see Appendix A) or to "sign up today" (Project 142, see Appendix A).

**Figure 4a. Problem statement**



**Narration**
Meet James. He's a busy businessman needing to catch an early flight. And this is Abby, a freelancer working today at the airport coffee shop. Both are getting a little low on battery power for their devices, so they plug in to the nearest connector and keep working. As they go to leave, they forget to grab their MacBook and iPhone that are still charging.

**Timing**
0.01–0.21 (20 seconds)

**Figure 4b. Product description**



**Narration**
But Abby has the TetherMe App installed on her Apple watch, and when she gets too far away from a linked device, she gets an alert that prompts her to go back for it.

**Timing**
0.22–0.31 (9 seconds)

**Figure 4c. Product availability**



**Narration**
TetherMe, an app you can't leave behind, available soon in the App Store.

**Timing**
0.43-0.49 (6 seconds)

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## Cross-cultural Analysis of Successful U.S. and Successful Non-U.S. Videos

Because Kickstarter began as a U.S. platform, many of the campaigns (n=17, 34%) analyzed in this study originated in the US. However, it is worth noting that many of the campaigns are also from creators based in other countries, particularly Europe (n=24, 48%). Both U.S. and non-U.S. campaigns included successful and failed projects. Table 2 presents the country of origin for the 50 videos (25 successful and 25 failed videos) examined in this study.

**Table 2. The total number of campaigns examined in this study and their country of origin**

| Country of Origin | Total # of Campaigns (%) | # of Successful Campaigns (%) | # of Failed Campaigns (%) |
|---|---|---|---|
| US | 17 (34%) | 10 (40%) | 7 (28%) |
| UK | 10 (20%) | 3 (12%) | 7 (28%) |
| France | 4 (8%) | 3 (12%) | 1 (4%) |
| Australia | 3 (6%) | 2 (8%) | 1 (4%) |
| Germany | 3 (6%) | 2 (8%) | 1 (4%) |
| New Zealand | 3 (6%) | 0 (0%) | 3 (12%) |
| Italy | 2 (4%) | 0 (0%) | 2 (8%) |
| Sweden | 2 (4%) | 1 (4%) | 1 (4%) |
| Canada | 1 (2%) | 0 (0%) | 1 (4%) |
| Netherlands | 1 (2%) | 1 (4%) | 0 (0%) |
| Singapore | 1 (2%) | 1 (4%) | 0 (0%) |
| South Korea | 1 (2%) | 1 (4%) | 0 (0%) |
| Spain | 1 (2%) | 0 (0%) | 1 (4%) |
| Switzerland | 1 (2%) | 1 (4%) | 0 (0%) |

When we compared the physical characteristics of successful U.S. videos (n=10) with successful non-U.S. videos (n=15), one of the greatest differences related to the *presence of the creator onscreen*: 80% of successful U.S. videos (n=8) comprised an onscreen creator presentation compared with only 53% of non-U.S. videos (n=8). Another interesting difference related to the total number of *static pictures*, which appeared in 80% of successful U.S. videos (n=8) compared with 53% of non-U.S. videos (n=8). The majority of U.S.

(n=7, 70%) and non-U.S. videos (n=12, 80%) showed the final product (see Table 3).

**Table 3. Cross-cultural analysis of the physical characteristics of successful U.S. and non-U.S. videos**

| Physical Characteristic | # of Successful U.S. Videos (%) | # of Successful non-U.S. Videos (%) |
|---|---|---|
| Aspect (4:3) | 2 (20%) | 1 (7%) |
| Aspect (16:9) | 8 (80%) | 13 (87%) |
| Total Static Pictures | 8 (80%) | 8 (53%) |
| Iconic static pictures | 7 (70%) | 6 (40%) |
| Analytic static pictures | 4 (40%) | 6 (40%) |
| Total dynamic pictures | 10 (100%) | 14 (93%) |
| Realistic dynamic pictures | 10 (100%) | 12 (80%) |
| Animations | 4 (40%) | 8 (53%) |
| Variable frame rate (sped up or slowed down) | 3 (30%) | 4 (27%) |
| Coloured pictures | 10 (100%) | 15 (100%) |
| Black and white pictures | 0 (0%) | 3 (20%) |
| Title | 2 (20%) | 3 (20%) |
| Logo | 7 (70%) | 12 (80%) |
| Final Product | 7 (70%) | 12 (80%) |
| Conceptual product (prototype) | 2 (20%) | 4 (27%) |
| Onscreen text (all) | 8 (80%) | 12 (80%) |
| Onscreen text instead of narration | 2 (20%) | 4 (27%) |
| Short texts | 8 (80%) | 10 (67%) |
| Long texts | 1 (10%) | 2 (13%) |
| Subtitles | 1 (10%) | 1 (7%) |
| Onscreen Creator Presentation | 8 (80%) | 8 (53%) |
| Offscreen creator narration | 7 (70%) | 9 (60%) |
| Music opening/closing only | 1 (10%) | 1 (7%) |
| Music throughout | 9 (90%) | 13 (87%) |
| Sound | 1 (10%) | 5 (33%) |
| Noise | 1 (10%) | 2 (13%) |
| Narrative speed (words/min) | 146wpm | 134wpm |

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In terms of rhetorical appeals in spoken narration, we found that all (100%) successful U.S. videos (n=9) and 91% of successful non-U.S. videos (n=10) comprised the P1 (*descriptive terms with an emotional narrative*) subtype appeal and all U.S. and non-U.S. videos (100%) used the P2 (*positive, emotionally rewarding implications*) subtype appeal (n=9 and n=11, respectively) (see Table 4). However, it is interesting to note that non-U.S. videos comprised the P3 subtype (*claims of exclusivity*) more than twice as often (n=8, 73%) as U.S. videos (n=3, 33%). The majority (n=8, 89%) of U.S. videos and all (n=11, 100%) non-U.S. videos comprised the L1 subtype (*factual data on the project, its features and functionality*). Successful U.S. videos were more likely (n=6, 67%) to comprise the L4 subtype (*information on why exactly the creator needs donations, and how he/she might use them*) than non-U.S. videos (n=4, 36%). Marginally, more U.S. videos (n=7, 78%) used the E1 subtype (*reference to professional expertise, practical experience, or prior success*) than non-U.S. videos (n=8, 73%). Finally, we found that all (n=9, 100%) successful U.S. videos used the K2 (*references to timeliness or a call to action to support the project*) subtype appeal compared with 73% (n=8) of non-U.S. videos. Given the relatively small number of videos, we found no significant differences for the other *ethos*, *logos*, or *kairos* subtypes.

**Table 4. Cross-cultural analysis of the rhetorical characteristics of successful US and non-US videos comprising spoken narration**

| Rhetorical Subtype | # of Successful U.S. Videos (%) | # of Successful non-U.S. Videos (%) |
|---|---|---|
| E1: A reference to professional expertise, practical experience in technology, or prior success in technology relevant to the project. | 7 (78%) | 8 (73%) |
| E2: A reference to the involvement of a famous figure, organization, or product in technology, which is recognized by a large number of people. | 3 (33%) | 2 (18%) |
| E3: A reference to third-party recommendations, reviews, or testimonials. | 3 (33%) | 1 (9%) |
| P1: The use of descriptive terms with an emotional narrative such as 'stunning', 'amazing', 'beautiful', etc. | 9 (100%) | (91%) |
| P2: A reference to the positive, emotionally rewarding implications of supporting the project (e.g. 'changing the way people experience video games forever'), or to the negative implications of the failure to support the project. | 9 (100%) | 11 (100%) |
| P3: A reference to claims of exclusivity of the product, such as by the word 'unique'. | 3 (33%) | 8 (73%) |
| L1: Factual data on the product, its features, and functionality (such as a list of specifications). | 8 (89%) | 11 (100%) |
| L2: Information on the practical benefits of making donations (rewards offered and benefits to supporters) e.g. 'with most pledges, we'll also be sending out…' | 3 (33%) | 2 (18%) |
| L3: Information on financial terms (affordability, discounts, guarantees of refund, shipping conditions, etc.). | 2 (22%) | 0 (0%) |
| L4: Information on why exactly the creators need donations, and how they will use the donations. | 6 (67%) | 4 (36%) |
| L5: General data (background information, problems that the product will solve, etc.). | 8 (89%) | 10 (91%) |
| K1: Contextual information on why the project fulfills a need for the current situation (e.g. 'This is the only product that does X' or 'You will need this product when you want to do X'). | 6 (67%) | 10 (91%) |
| K2: Reference to timeliness or a call to action to support the project (e.g. there is a call to 'act now' or deadlines or goals are used). | 9 (100%) | 8 (73%) |

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## Conclusions, Limitations, and Recommendations for Future Research

Kickstarter projects are rarely for-profit projects; they are created by small entrepreneurs who are looking to cover the initial cost of manufacture for their product. Supporters often fund these campaigns because they want to be part of a real community and to feel like they are providing a valuable contribution to a project that would otherwise fail to receive finance.

The results from this study show that while successful and failed campaign videos shared many basic features, successful videos often contained elements that were lacking in many failed videos (e.g., they were more likely to demonstrate images of the final product than a prototype). Our findings suggest that if project campaigners spend time and effort incorporating these kinds of elements into their videos, the videos are more likely to be engaging and persuasive for potential investors. The distinguishing factors between successful and failed videos related to both the physical characteristics of the video and the rhetorical appeals used in the spoken narration.

The rhetorical appeals of successful videos help the viewers to empathize with the creators, and the video is a chance for the creators to showcase their passion for the project. The videos also reinforce the important role supporters play in funding the project. These qualities distinguish them from television commercials, for example, which are created on behalf of large for-profit organizations and in which all of the emphasis is on the product.

Table 5 presents a summary of the ideal characteristics for Kickstarter campaign videos for technology projects.

The inclusion of all these elements in a single project video may not necessarily be required. Indeed, there was not a single example among the 50 videos in this study where all of the characteristics were present at the same time. However, this profile could potentially be treated as a reference for developing campaign videos for technology products on crowdfunding platforms. Similarly, many of these findings are applicable to technical communication practitioners who want to develop engaging and persuasive videos to promote products via online outlets. These findings are also applicable to educators—for example, recommendations about the length of videos and the

**Table 5. Guidelines for the design of Kickstarter campaign videos for technology products based on the characteristics of successful videos**

| # | Guideline |
|---|---|
| 1 | Use a combination of graphics<br>• Use static pictures and other visual materials to illustrate the details of the product<br>• Use dynamic pictures to introduce the creator<br>• Link the visual materials to the narration |
| 2 | Reduce onscreen text<br>• Use narration (onscreen and off-screen) rather than long onscreen text to present information<br>• Use short texts for labels, to emphasize important words, or to introduce the creator |
| 3 | Use high quality visuals and audio materials<br>• Record and upload the video in 16:9 aspect ratio<br>• Film in 30 frames per second<br>• Reduce background noise<br>• Use appropriate background music throughout the video |
| 4 | Show the final product (if available) or prototype onscreen<br>• Demonstrate how the product operates<br>• Show a logo for the company or product |
| 5 | Use reasonable timing<br>• Keep video length to approximately 2 minutes 30 seconds<br>• Narrate at approximately 140 words per minute |
| 6 | Use rhetorical appeals in the narrative<br>• Provide background information on a problem that this project will help to solve<br>• Refer to the exclusivity of the project and provide data on its features and functionality<br>• Use appropriate descriptive terms with an emotional narrative<br>• Refer to the creator's professional expertise<br>• Provide information on the general benefits and positive implications of supporting the project |

use of high quality visuals and audio are likely to be helpful in the creation of effective instructional videos. However, it is worth noting that instructional videos aim to inform their audience rather than persuade and so will differ in other ways, such as in the use of narrative and rhetorical appeals.

While the videos we analyzed were developed for technology projects specifically on the Kickstarter

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platform, future studies could investigate the usefulness of these findings and guidelines to projects from other categories, hosted on other platforms, and using different crowdfunding models. It is possible that the underlying dynamics of different crowdfunding categories and platforms vary (Belleflamme et al., 2014). For example, if attempting to source funds for an artistic project, the audience might expect a high-quality video; however, for other types of projects, the product might be more important than the video (Young, 2013). Furthermore, sub-categories within Kickstarter categories may also yield different results (e.g., apps might be more/less successful than robotics).

As this study examined videos within a relatively short timeframe (January to March 2016), a longer period could yield even more interesting results. Furthermore, this study does not examine where and how the Kickstarter campaigns were advertised. A search engine optimization (SEO) and social marketing campaign, for example, can also contribute to project success.

There are a number of possible avenues for future research. Researchers could investigate if the characteristics of zero-funded project videos differ from funded project videos or if the types of rhetorical appeals used determine the number of project backers. A larger dataset may yield more interesting results relating to cross-cultural differences between videos produced in different countries. Finally, future research could incorporate interviews and/or focus group studies to provide greater insights into the opinions of backers and video creators. It would be interesting to learn how people feel when watching crowdfunding campaign videos. Such research would provide even more valuable information on how to make crowdfunding videos more effective persuasive tools and how to make more effective videos for other purposes.

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# Crowdfunding Project Videos

## Appendix A. List of videos included in final analysis

| Project ID | Project name (video length; campaign length) | URL |
|---|---|---|
| **Successful Projects** | | |
| 101 | LoPy – the LoRa, WiFi and Bluetooth IoT development platform (4 mins 0 secs; 35 days) | https://www.kickstarter.com/projects/1795343078/lopy-the-lora-wifi-and-bluetooth-iot-development-p |
| 102 | Carbonshade: Fashionable Blue-Blocking Eyewear (2 mins 56 secs; 30 days) | https://www.kickstarter.com/projects/jeremymaluf/carbonshade-fashionable-blue-blocking-eyewear |
| 103 | Pins Collective (1 min 4 secs; 30 days) | https://www.kickstarter.com/projects/pinscollective/pins-collective |
| 104 | ALEX, Wearable Posture Tracker and Coach (2 mins 18 secs; 30 days) | https://www.kickstarter.com/projects/891603560/alex-wearable-posture-tracker-and-coach |
| 105 | Immersit - Awesome Motion & Vibration Device Under Your Sofa (3 mins 53 secs; 35 days) | https://www.kickstarter.com/projects/423274566/immersit-awesome-motion-and-vibration-device-under |
| 106 | FlightBox ADS-B Receiver Kit (3 mins 15 secs; 30 days) | https://www.kickstarter.com/projects/251459606/flightbox-ads-b-receiver-kit |
| 107 | Mindful Running? Learn How! (1 min 33 secs; 36 days) | https://www.kickstarter.com/projects/130456043/the-r-evolution-of-running |
| 108 | WizzPic: A New Photo Sharing & Messaging App (1 min 43 secs; 60 days) | https://www.kickstarter.com/projects/314781380/wizzpic-a-new-photo-sharing-and-messaging-app |
| 109 | SupConf: A Conference For Support Professionals (3 mins 7 secs; 30 days) | https://www.kickstarter.com/projects/supportdriven/supconf-a-conference-for-support-professionals |
| 110 | iBoardbot. The internet controlled whiteboard robot (2 mins 49 secs; 30 days) | https://www.kickstarter.com/projects/879074320/iboardbot-the-internet-controlled-whiteboard-robot |
| 111 | SIMPLE STEADY - The steadycam for everyone (2 mins 19 secs; 30 days) | https://www.kickstarter.com/projects/simplesteady/simple-steady-the-steadycam-for-everyone |
| 112 | Culture Clips Pilot Launch (3 mins 54 secs; 30 days) | https://www.kickstarter.com/projects/120776119/culture-clips-pilot-launch |
| 113 | Holo – Smartphone & Tablet Hologram (2 mins 5 secs; 30 days) | https://www.kickstarter.com/projects/uppfinr/holo-smartphone-and-tablet-hologram |
| 114 | Novel Writing Software (2 mins 15 secs; 20 days) | https://www.kickstarter.com/projects/1426758021/novel-writers-software |
| 115 | PenSe: Apple Pencil Case. Make the world your canvas. (3 mins 6 secs; 30 days) | https://www.kickstarter.com/projects/1255482952/pense-the-1st-multi-functional-apple-pencil-case-p |
| 116 | Super Clamp V1: The World's Most Versatile Mini Clamp (1 min 41 secs; 30 days) | https://www.kickstarter.com/projects/971024944/super-clamp-v1-the-worlds-most-versatile-mini-clam |
| 117 | Mitchell & Johnson Electrostatz Headphones (2 mins 8 secs; 35 days) | https://www.kickstarter.com/projects/214784295/mitchell-and-johnson-electrostatz-headphones |
| 118 | ChameleonMini - A Versatile NFC Card Emulator, and more... (4 mins 26 secs; 45 days) | https://www.kickstarter.com/projects/1980078555/chameleonmini-a-versatile-nfc-card-emulator-and-mo |

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| Project ID | Project name (video length; campaign length) | URL |
|---|---|---|
| 119 | Lumiere - automated essential oil diffuser (3 mins 42 secs; 35 days) | https://www.kickstarter.com/projects/1732003212/lumiere-smart-essential-oil-diffuser-for-wellbeing |
| 120 | Complete course: Build Kickstarter with Python and Bootstrap (2 mins 19 secs; 30 days) | https://www.kickstarter.com/projects/1194260866/complete-course-build-kickstarter-with-python-and |
| 121 | Pi433 - A radio module (Funkmodul) for raspberry pi (26 secs; 38 days) | https://www.kickstarter.com/projects/1292669042/pi433-a-radio-module-funkmodul-for-raspberry-pi |
| 122 | C-Cable: The multi-functional capsule cable you ever need (1 min 4 secs; 25 days) | https://www.kickstarter.com/projects/1092341030/c-cable-the-multi-functional-capsule-cable-you-eve |
| 123 | Virtuali-Tee: The Ultimate Way to Learn About the Body! (2 mins 22 secs; 30 days) | https://www.kickstarter.com/projects/curiscope/virtualitee |
| 124 | $259 Reach 3D Printer (1 min 57 secs; 24 days) | https://www.kickstarter.com/projects/2121749597/259-reach-3d-printer |
| 125 | TravelerBuddy  hassle-free travel (2 mins 7 secs; 31 days) | https://www.kickstarter.com/projects/1048697752/travelerbuddy-hassle-free-travel |
| Failed Projects | | |
| 126 | A new Social Network: Wallaby-JUMP IN! (2 mins 29 secs; 30 days) | https://www.kickstarter.com/projects/986828570/a-new-social-network-wallaby-jump-in |
| 127 | ScoreCrazy.com (2 mins 40 secs; 60 days) | https://www.kickstarter.com/projects/634606361/scorecrazycom |
| 128 | Take My Hand (1 min 5 secs; 30 days) | https://www.kickstarter.com/projects/1134482491/take-my-hand-0 |
| 129 | Nitonet Virtual MultiSIM (telecommunications) (1 min 53 secs; 60 days) | https://www.kickstarter.com/projects/1120282610/telecom-multivirtual-sim |
| 130 | Adjustable HotEnds + Auto Bed Leveling RepRap 3D Printers (6 mins 12 secs; 22 days) | https://www.kickstarter.com/projects/876293534/adjustable-hotends-auto-bed-leveling-reprap-3d-pri |
| 131 | Laundrotapp: On demand laundry service (1 min 45 secs; 30 days) | https://www.kickstarter.com/projects/1314336765/laundrotapp-on-demand-laundry-service |
| 132 | J1772 WiFi Electric Vehicle Charge Controller (1 min 57 secs; 30 days) | https://www.kickstarter.com/projects/1798310966/j1772-wifi-electric-vehicle-charge-controller |
| 133 | Nudgu Reminder App for Dementia or Diabetes Carers. (2 mins 3 secs; 30 days) | https://www.kickstarter.com/projects/1091505153/nudgu-reminder-app-for-dementia-or-diabetes-carers |
| 134 | Smartphone Spectroscope (2 mins 19 secs; 60 days) | https://www.kickstarter.com/projects/1961343173/smartphone-spectroscope |
| 135 | Netzwall - first affordable Viruswall solution for everyone! (8 mins 31 secs; 30 days) | https://www.kickstarter.com/projects/481923650/netzwall-first-affordable-viruswall-solution-for-e |
| 136 | Hand sensor for programing robotic hands to copy movement. (2 mins 12 secs; 60 days) | https://www.kickstarter.com/projects/914346892/hand-configuration-sensor |

## Crowdfunding Project Videos

| Project ID | Project name (video length; campaign length) | URL |
|---|---|---|
| 137 | Cities Talking - Discover the World Your Way (2 mins 11 secs; 30 days) | https://www.kickstarter.com/projects/423214180/cities-talking-discover-the-world-your-way |
| 138 | Simple WS2812B LED Interface/Controller chip (16 secs; 60 days) | https://www.kickstarter.com/projects/1338646202/simple-ws2812b-led-interface-controller-chip |
| 139 | 8_LAB Visual Arts Platform (15 secs; 14 days) | https://www.kickstarter.com/projects/512520029/8-lab-visual-arts-platform |
| 140 | TetherMe App (49 secs; 20 days) | https://www.kickstarter.com/projects/astroapps/tetherme-app |
| 141 | Multipurpose USB Fuse (3 mins 34 secs; 30 days) | https://www.kickstarter.com/projects/885642492/multipurpose-usb-fuse |
| 142 | weActiv - Connect. Share. Compare! (32 secs; 30 days) | https://www.kickstarter.com/projects/1938501050/weactiv-connect-share-compare |
| 143 | I-Save- Never Lose Your Files Again (2 mins 45 secs; 30 days) | https://www.kickstarter.com/projects/1824283032/i-save |
| 144 | Flex-Mitts - Let the Training Revolution Begin! (2 mins 24 secs; 30 days) | https://www.kickstarter.com/projects/1450213975/flex-mitts-let-the-training-revolution-begin |
| 145 | Build a Search Engine and more - Web Engineering Course (1 min 28 secs; 30 days) | https://www.kickstarter.com/projects/1588812003/build-a-social-network-and-more-web-engineering-co |
| 146 | Driveway (1 min 3 secs; 30 days) | https://www.kickstarter.com/projects/1972084284/driveway |
| 147 | Recess (4 mins 58 secs; 30 days) | https://www.kickstarter.com/projects/642142846/recess |
| 148 | iBoske: Provide solutions using actionable decision trees! (2 mins 9 secs; 30 days) | https://www.kickstarter.com/projects/827093675/iboske-provide-solutions-using-actionable-decision |
| 149 | Footballinclusive: Where Football Fans Unite (2 mins 42 secs; 32 days) | https://www.kickstarter.com/projects/footballinclusive/footballinclusive-where-football-fans-unite |
| 150 | Help Teachers Trade Stuff with Other Teachers (2 mins 6 secs; 30 days) | https://www.kickstarter.com/projects/wilsonreyes/help-teachers-trade-stuff-with-other-teachers |

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## Appendix B. Codebook for recording the external properties of videos

**Unit of data collection:** Campaign videos listed in Appendix A, which were randomly selected from the Kickstarter technology projects that were launched in the first three months of 2016.

**Project ID:** Fill in the video's ID number.

**Project title**: Give the title of the Kickstarter project.

**Project success:** Indicate whether the project reached its funding goal or not.
   5. *Failed.* The project failed to reach its funding goal.
   6. *Successful.* The project succeeded in reaching its funding goal.

**URL:** Give the website address of the project page.

**Creator**: Give the name of the project creator. All projects must be from first-time creators.

**Campaign start date:** Give the date on which the creator launched the project on Kickstarter.

**Campaign duration:** Report the total length of the campaign, in days.

**Currency:** Report the currency used for the project.

7. Australian Dollar
8. British Pound
9. Canadian Dollar
10. Euro
11. New Zealand Dollar
12. Swedish Krona
13. Swiss Franc
14. US Dollar

**Funding goal:** Give the total amount of money that the creator wished to raise, in US dollars. Use the conversion rate from 6th June 2016 to convert all currencies to US dollars. This date represents the beginning of the data-sampling period for this research.

**Total amount raised:** Give the total amount of money that the project raised at the end of the campaign, in U.S. dollars. Use the conversion rate from 6th June 2016 to convert all currencies to U.S. dollars.

**Percentage funded:** Report the total amount of money raised as a percentage of the original funding goal.

**Total backers:** Give the total number of supporters that pledged money towards the project.

# Crowdfunding Project Videos

## Appendix C. Codebook for recording the physical characteristics of videos

**Unit of data collection:** Campaign videos listed in Appendix A, which were randomly selected from the Kickstarter technology projects that were launched in the first three months of 2016.

**Project ID:** Fill in the video's ID number.

**Project success:** Indicate whether the project reached its funding goal or not.
1. *Failed.* The project failed to reach its funding goal.
2. *Successful.* The project succeeded in reaching its funding goal.

### Resolution:
**Spatial resolution:** Give the screen aspect ratio.
1. 0.526 (vertical screen)
2. 2.25:1
3. 4:3
4. 16:9
5. 16:10

### Visuals:
**Colored pictures:** Report the occurrence of colored visuals in the video.
1. Colored pictures absent
2. Colored pictures present

**Black and white pictures.** Report the occurrence of black and white visuals in the video.
1. Black and white pictures absent
2. Black and white pictures present

**Dynamic pictures:** Report the occurrence of pictures that show change over time (moving images).
1. Dynamic pictures absent
2. Dynamic pictures present

**Real or realistic dynamic pictures:** Report the occurrence of real-world images that show change over time.
1. Realistic dynamic pictures absent
2. Realistic dynamic pictures present

**Animations:** Report the occurrence of sets of illustrated stills whose rapid presentation creates the illusion of movement (change over time).
1. Animations absent
2. Animations present

**Static pictures:** Report the occurrence of static pictures or stills (single images without motion) in the video.
1. Static pictures absent
2. Static pictures present

**Iconic static pictures:** Report the occurrence of realistic still images in the video.
1. Iconic static pictures absent
2. Iconic static pictures present

**Analytic static pictures:** Report the occurrence of illustrated still images in the video.
1. Analytic static pictures absent
2. Analytic static pictures present

### Audio:
**Onscreen presentation:** Report the occurrence of spoken words in the video by a person or persons who are visible onscreen.
1. Onscreen presentation absent
2. Onscreen presentation present

**Off-screen narration:** Report the occurrence of spoken words in the video by a person not visible onscreen.
1. Off-screen narration absent
2. Off-screen narration present

**Music in the opening and/or closure only:** Report the occurrence of music at the beginning and/or end of the video.
1. Music absent at opening and/or closing
2. Music present at opening and/or closing

**Music (almost) constantly present:** Report the occurrence of music throughout the video.
1. Music absent throughout video
2. Music present throughout video

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**Sound:** Report the presence of audio elements used to create a special sound effect in the video (including bleeps, pings, and swoosh sounds).
1. Sound effects absent
2. Sound effects present

**Noise:** Report the presence of undesirable sounds that happen to have been recorded (static buzzing, background noise, heavy breathing, etc.).
1. Undesirable noise absent
2. Undesirable noise present

## Onscreen texts:
**Title:** Report the occurrence of a video title or title screen
1. Video title absent
2. Video title present

**Onscreen text:** Report the occurrence of textual information on the screen (other than the title).
1. Onscreen text absent
2. Onscreen text present

**Short texts:** Report the occurrence of short onscreen texts (labels, names, short phrases, etc.)
1. Short texts absent
2. Short texts present

**Long texts:** Report the occurrence of long onscreen texts, which often carry the main message.
1. Long texts absent
2. Long texts present

**Subtitles:** Report the occurrence of texts that present the spoken words onscreen.
1. Subtitles absent
2. Subtitles present

## Branding:
**Logo:** Report the occurrence of a company or product logo in the video.
1. Logo absent
2. Logo present

**Final product:** Report the occurrence of the finished product in the video.
1. Finished product absent
2. Finished product present

**Conceptual product:** Report the occurrence of the imagined finished product in the video (sketches, prototype, technical drawings, etc.).
1. Conceptual product absent
2. Conceptual product present

## Tempo:
**Narrative speed:** Indicate the pace of the talk by the presenter or narrator, if any, in words per minute.

**Temporal resolution:** Report the average frame rate of the video, in frames per second.

**Variable frame rate:** Report the occurrence of scenes where the frame rate is either increased or decreased to create the illusion of a faster or slower passage of time.
1. Scenes with variable frame rate absent
2. Scenes with variable frame rate present

**Video length:** Report the total duration of the video in seconds.

# Crowdfunding Project Videos

## Appendix D. Codebook for recording the rhetorical appeals and subtypes used in video narration

**Unit of data collection:** Campaign videos listed in Appendix A, which contain a spoken word component in the form of an off-screen narrator, onscreen presenter, or both.

**Project ID:** Fill in the video's ID number.

**Project success:** Indicate whether the project reached its funding goal or not.
1. *Failed.* The project failed to reach its funding goal.
2. *Successful.* The project succeeded in reaching its funding goal.

**Ethos:** Indicate the frequency of occurrence of an *ethos* appeal type within the video.
1. A reference to professional expertise, practical experience in technology, or prior success in technology relevant to the project.
   2. Appeal subtype absent
   3. Appeal subtype present
2. A reference to the involvement of a famous figure, organization, or product in technology, which is recognized by a large number of people.
   1. Appeal subtype not present
   2. Appeal subtype present
3. A reference to third-party recommendations, reviews, or testimonials.
   1. Appeal subtype not present
   2. Appeal subtype present

**Pathos:** Indicate the frequency of occurrence of a *pathos* appeal type within the video.
1. The use of descriptive terms with an emotional narrative such as 'stunning', 'amazing', 'beautiful', etc.
   1. Appeal subtype not present
   2. Appeal subtype present
2. A reference to the positive, emotionally rewarding implications of supporting the project (e.g. 'changing the way people experience video games forever'), or to the negative implications of the failure to support the project
   1. Appeal subtype not present
   2. Appeal subtype present

3. A reference to claims of exclusivity of the product, such as by the word 'unique'.
   1. Appeal subtype not present
   2. Appeal subtype present

**Logos:** Indicate the frequency of occurrence of a *logos* appeal type within the video.
1. Factual data on the product, its features, and functionality (such as a list of specifications).
   1. Appeal subtype not present
   2. Appeal subtype present
2. Information on the practical benefits of making donations (rewards offered and benefits to supporters) (e.g. 'with most pledges, we'll also be sending out…').
   1. Appeal subtype not present
   2. Appeal subtype present
3. Information on financial terms (affordability, discounts, guarantees of refund, shipping conditions, etc.).
   1. Appeal subtype not present
   2. Appeal subtype present
4. Information on why exactly the creators need donations, and how they will use the donations.
   1. Appeal subtype not present
   2. Appeal subtype present
5. General data (background information, problems that the product will solve, etc.).
   1. Appeal subtype not present
   2. Appeal subtype present

**Kairos:** Indicate the frequency of occurrence of a *kairos* appeal type within the video.
K1. Contextual information on why the project fulfills a need for the current situation (e.g. 'This is the only product that does X' or 'You will need this product when you want to do X').
   1. Appeal subtype not present
   2. Appeal subtype present

K2. Reference to timeliness or a call to action to support the project (e.g. there is a call to 'act now' or deadlines or goals are used).
   1. Appeal subtype not present
   2. Appeal subtype present

# Expository Warnings in Public Recreation and Tourism Spaces

By Emil B. Towner

**Abstract**

**Purpose:** Every day, people are exposed to risks they either do not know exist or do not understand how to avoid. This is especially true in locations where the public may not expect or understand the danger around them—such as amusement parks, national parks, or unfamiliar vacation spots. Although a number of factors influence the effectiveness of a warning, this study focuses specifically on the use of expository versus abridged language in warning signs.

**Method:** This research was conducted in two phases. First, I distributed an online survey that was completed by 303 participants who were randomly assigned to view one of two warning sign options and then were asked to describe the sign's meaning. Second, I conducted a content analysis of the survey responses using coding terms (related to Bloom's Taxonomy) to assess the levels of understanding that resulted from the two warning sign versions.

**Results:** My findings indicate that people who viewed a longer, more detailed expository warning from a national park were more likely to understand the risks and consequences as well as how to apply the information to new situations or specific actions. In other words, they demonstrated a higher level of understanding risks and risk avoidance.

**Conclusions:** In public recreation and tourism spaces, detailed expository warning signs may be more effective at helping the public understand unfamiliar risks and how to avoid them. However, reading times (max. 30 seconds) and contexts (near resting/standing areas) should be considered.

**Keywords:** safety signage, risk communication, public safety, expository warnings

**Practitioner's Takeaway:**

- Longer, more detailed expository warnings (especially in recreation spaces where people frequently gather or expect signs to be posted) may support better understanding of risks and risk avoidance than abridged warnings (such as "No Swimming").
- People responsible for public safety in outdoor recreation and tourism spaces should use the findings to identify inadequate warnings that are currently in place (before an injury occurs) and develop more effective signs.
- People responsible for safety in non-recreation locations, such as dangerous workplaces, should also consider testing expository warnings in breakrooms or changing areas where employees rest or have time to read.

# Expository Warnings

## Introduction

Every day, people are exposed to risks they either do not know exist or do not understand how to avoid. In some cases, the public may anticipate (though not completely understand) that risks exist when entering dangerous locations (such as factories, construction sites, etc.) or engaging in risky behavior (such as smoking, drinking and driving, texting and driving, etc.). However, in other locations—such as amusement parks, national parks, or unfamiliar vacation spots—the public either may not expect or is not focused on the potential risks that surround them. In fact, the opposite may often be the case. Instead of expecting hazards and considering risks, the public may think of these locations as controlled environments containing fun, safe activities. As Espiner (1999) explained, tourists have a "sense of security based on the controlled, predictable and urban communities in which most people now live"; however, the natural public recreation areas they visit "are often not entirely controlled or predictable—or, at least, they have the potential to become inhospitable or dangerous" (p. 12). In some instances, people may simply be unaware of the risks that exist in such places (Whittlesey, 2014). In other instances, people may be aware that some level of risk exists, but they may not believe they have any control over the risks in vacation or recreation locations, may assume the responsibility for risk mitigation belongs to someone else, or may be unaware of specific actions they should take to avoid the risks (Espiner, 1999; Jackson et al., 1996; Njome et al., 2010; Wachinger et al., 2013).

Take, for example, the fatal attack of a two-year-old child by an alligator at Disney's Florida resort in 2016. That tragedy highlighted the inadequacy of the warning sign used by Disney, which merely told visitors not to swim in the water. That warning sign was problematic in two ways. First, the sign used the term *swimming* but did not define *swimming* as wading or even walking a few inches into the water. The official report of the tragedy indicated that the child's parents were near the two-year-old victim while he was standing on the shoreline with his feet "ankle deep or less in the water," as he bent over to fill his bucket with water to make a sandcastle (Florida Fish and Wildlife, 2016, p. 4). It is unlikely that the child's parents (or an average person for that matter) would have characterized that act as *swimming*. Second, the sign failed to inform the parents (and other park visitors) about either the presence of dangerous

wildlife or about the severity of the threat posed by such wildlife. Yet, the official report of the tragedy explicitly stated that "Alligators routinely hunt and kill prey along the shore and drag it into the water" (Florida Fish and Wildlife, 2016, p. 12). Unfortunately, that information was not communicated to the parents via the warning sign. Instead, the sign merely commanded park visitors not to perform an action (i.e., "no swimming") without explaining why or what potential harm may result. Legal experts summed up why the missing information would have been useful to park visitors: "Although Floridians know that alligators live in nearly every freshwater body in the state…it would be reasonable to argue that vacationers coming from somewhere like Nebraska wouldn't share the same knowledge" (Mettler & Sharma, 2016, para. 3).

As the Disney resort tragedy highlights, not all warning signs effectively "alert and inform" the public about "potential hazards, so people can act to avoid the consequences" (Ayres, 2013, p. 1698). Obviously, a number of factors can influence the effectiveness of a warning, including the placement, color, shape, appearance of a border around the warning, size and font of the text, interactivity, and so on (Rogers, Lamson, & Rousseau, 2000). This study, however, is focused on the language or verbiage used in warning signs. In contrast to many of the previous studies on warning language that are discussed in the literature review below (which studied the warning language used on product packaging), I explore warnings used in tourism and recreation spaces that are unfamiliar to the average visitor and, therefore, may pose risks people could not be expected to anticipate.

Like the Disney resort, Yellowstone National Park provides another example of a location where the public is exposed to risks they may not be accustomed to or fully understand. Each year, people are exposed to (and, at times, disregard) safety warnings regarding hazards, including thermal water pools, geysers, and wildlife. For example, nearly every year, park visitors are attacked by bison. In fact, bison injure more park visitors than any other animal in Yellowstone. According to one study, bison charged at park visitors 81 times over a 22-year period, and, back in 1987, more than 40 people were injured by bison in Yellowstone (Miller, 2015). In many cases, reports of the attacks indicate that the victims were told not to approach wildlife; however, having been to Yellowstone and having witnessed the abundance of wildlife in close proximity to park visitors, I question whether the public understands the warnings and risks

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well enough to choose safe actions. I do not mean to imply that the National Park Service or its employees are misleading visitors or overlooking safety obligations. After all, safety information from flyers to signs to verbal warnings from park rangers are present throughout Yellowstone on a wide range of hazards including wildlife and thermal attractions. In some cases, people visiting recreation spaces simply choose to ignore the warnings or deny they're at risk (Albers, 2012) and, in doing so, knowingly place themselves in dangerous situations. In other cases, people may see a warning but not completely understand the risk or how to mitigate it. For instance, one of Yellowstone's warning signs features the silhouette of a bison with text below it that reads "DANGER" followed by "DO NOT APPROACH WILDLIFE" (in all caps), but the sign does not provide information about a bison's speed or the severity of injury that is likely (see Figure 1). This warning sign exemplifies what I call an *abridged warning sign*. I use the term *abridged* because such warnings present shortened versions of risk and risk avoidance information while maintaining the general sentiment (e.g., what not to do); however, they are typically vague and lack explicit details regarding the exact nature of the danger or steps to avoid it.

Contrast that sign to another warning sign that is also displayed at Yellowstone, which I refer to as an expository warning sign (see Figure 2). I use the term expository because such warning signs use a longer form to explain risk and risk mitigation with facts and figures (rather than opinions) written in a logical order. For example, the warning sign in Figure 2 explicitly visualizes the danger of bison attacks by showing an illustration of a person being tossed into the air by a bison. This sign also provides specific information about bison size, speed, and unpredictability.



**Figure 1. An abridged warning sign conveys the general sentiment of a warning in a shortened version that lacks details or specificity. The original version of this sign was posted at Yellowstone National Park by the National Park Service.**
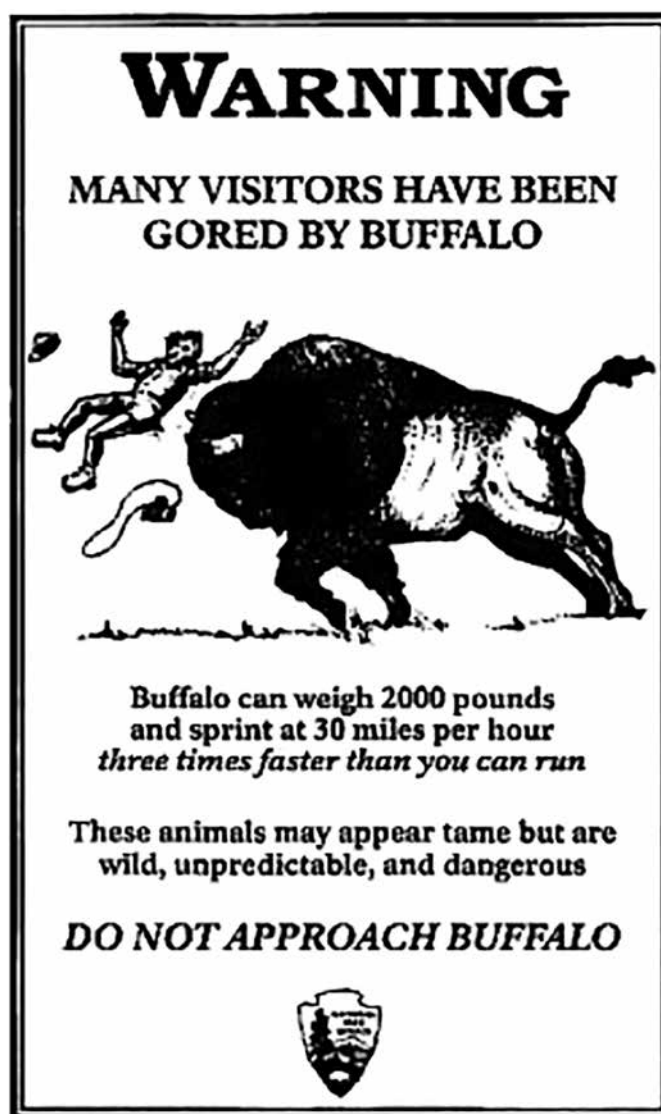


**Figure 2. A longer expository warning provides facts and details in a logical sequence. The original version of this sign was posted at Yellowstone National Park by the National Park Service.**

# Expository Warnings

These two signs provide different approaches to warning the public about the hazards of bison—including visual differences (colors, shapes, types of illustrations) and textual differences (length, tone, type of information). The signs are not posted in the same location but, instead, are distributed separately throughout the park in areas where people commonly congregate and where bison are known to frequently wander. The abridged warning is often seen on sign posts along boardwalks or near open fields, while the expository warning can be seen attached to sign posts along boardwalks and tacked to bulletin boards. Due to the vast size of the park and innumerable directions that visitors may undertake as they navigate the roads, trails, and tourist spots within the park, the signs are not posted in a specific sequence. That said, the park does provide other safety materials throughout the park in the form of handouts, displays, and so on.

Those safety materials (including warnings signs) deliver risk communication messages to people who visit Yellowstone. Risk communication is a multidisciplinary field with technical communication scholars and practitioners focusing on "predisaster, postdisaster, and prevention and participation discourse related to accidents and crises" (Youngblood, 2012, p. 40). At its most basic definition, risk communication can be defined as "the potential to lose something of value" (Espiner, 1999; Priest & Baillie, 1987). More nuanced definitions include aspects such as personal choice and uncertainty (Roehl & Fesenmaier, 1992) as well as cultural practices and social norms (Douglas & Wildavsky, 1982). Often, risk communication follows a "technocratic" approach that views "risk as determined by experts" and delivered to an audience in "linear (one-way)" communication that attempts to "educate/influence the public to think about risk the way the experts do" (Grabill & Simmons, 1998, pp. 421–422). More recently, however, technical communication scholars have argued against the linear, expert-driven (even male-dominated assuming) approach, opting instead for approaches that acknowledge different perspectives, experience-based knowledge, and different types of uncertainty in risk assessment and communication (Grabill & Simmons, 1998; Sauer, 1992; Sauer, 2003). Uncertainty is a critical factor in risk communication and is often thought of as "a lack or distortion of crucial technical information" (Walsh & Walker, 2016, p. 71). However, a broader

view of uncertainty (based on spheres of arguments) distinguishes between technical uncertainties, personal uncertainties, and political or public uncertainties (Walsh & Walker, 2016). Such distinctions enable technical communicators to better understand and predict how uncertainties "travel from their home sphere to another" (Walsh & Walker, 2016, p. 83), which ultimately shapes risk assessment and communication.

In addition to the aspects of risk assessment and uncertainty, previous research on warnings has uncovered a number of factors that influence the effectiveness of a warning, including the use of images, colors, borders around warnings, sizes and fonts of the text, placement/location, interactivity, and so on. This study, however, focused specifically on the language (length, specificity, etc.) used in warning signs. Therefore, before discussing the methods, findings, and implications of this study in more detail, I begin with a brief literature review of previous research related to warning-sign language.

## Literature Review of Warning-Sign Language

For the purposes of this study, I have grouped the major findings from previous research on warning-sign language into five key characteristics that influence effectiveness: signal words, length, complexity, explicitness, and hazard information.

### Signal Words

One way to increase the chance that a warning is noticed and taken seriously is to include a signal word—such as "danger," "warning," or "caution." In fact, Young et al. (1995) conducted two experiments with nearly 200 participants to test the importance of four warning sign elements: the signal word, a statement about the hazard, consequences of non-compliance, and instructions for mitigating the hazard. Results from both experiments indicated that participants viewed the signal word as the most important aspect included in a warning. That said, past research conflicts on which word is most effective. The American National Standards Institute (ANSI) provides some guidance on the use of signal words (and how they relate to both the likelihood and severity of risk, as indicated in italics below):

- DANGER:  The hazard *will* result in *death* or serious injury

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- WARNING: The hazard *could* result in *death* or serious injury
- CAUTION: The hazard *could* result in *minor* or moderate injury

Unfortunately, people (especially people unaccustomed to working in hazardous environments) may not understand that each term relates to a specific risk level. In that sense, the perceptions of people are more relevant to this study than the actual ANSI definitions. In terms of public perceptions, some studies have found that people perceive the word "danger" to indicate a more serious threat than other words, such as "warning," "caution," or "notice" (Braun & Silver, 1995; Wogalter & Silver, 1990). Other studies, however, found the words "danger," "warning," and "caution" to be similar in people's perceptions of severity (Leonard, Matthews, & Karnes, 1986; Wogalter et al., 1994). Despite those different findings, the general consensus is warnings that include a signal word are perceived as describing more of a threat than warnings without a signal word (Rogers et al., 2000). For example, Wogalter et al. (1994) found that when signal words were included in warnings, people perceived the level of risk or danger as being higher than when the same warning was shown without a signal word. However, Wogalter et al. (1994) did not find any statistical difference between the words "danger," "warning," or "caution," which indicates that all three terms are at least more effective at conveying risk than no signal word at all.

## Length

The length of text also impacts the public's perception of risk. According to past research, the longer the text, the more likely the public is to read it (Leonard et al., 1989; Silver et al., 1991). Rogers et al. (2000) noted that this may be due to the public's belief that "the greater the length of text, the more hazardous the product must be, and therefore it should be read" (p. 118). At first glance, the notion that longer text may be more effective than shorter text seems to conflict with previous research. For example, Wogalter et al. (1987) found that when people's time or the amount of space available for text is limited, "people may be more likely to read a short, concise message . . . than a long, wordy one" (p. 611). Similarly, Velotta (1987) suggested that technical writers "say as much as possible in as few words as possible" when writing safety information (p.

123). More important than the number of words or length of text, however, is the amount of time required to read a warning sign. Previous research indicates that visitors to natural recreation areas (such as wilderness trails) spend approximately 25 seconds (Cole et al., 1997) to 30 seconds (Hughes & Morrison-Saunders, 2002) reading signs that are posted near visitor centers or on bulletin boards. When reading signs at trail heads or along the actual wilderness trail, people spend approximately 10 to 15 seconds (Hughes & Morrison-Saunders, 2002). In other words, people responsible for public safety and risk communication should consider the context when determining the appropriate length of warning-sign text. In areas where visitors are more likely to rest or to expect signs to be posted, warnings should include only enough text to be read within the 25 to 30 seconds (Cole et al., 1997; Hughes & Morrison-Saunders, 2002). Conversely, in areas where people are less likely to read signs (i.e., areas in which they are constantly moving or are focusing their attention on other aspects, such as the scenery or their footing on a steep trail), warnings should include only enough text to be read within 10 to 15 seconds (Hughes & Morrison-Saunders, 2002).

## Explicitness

Effective risk communication must convey "unambiguous, definitive and easily interpreted" information (Breakwell, 2000, p. 116). According to past research, the more explicit (i.e., clear and detailed) the warning, the more likely people are to comprehend risk and risk mitigation (Laughery et al., 1991; Laughery et al., 1993; Laughery & Stanush, 1989; Rhoades et al., 1990; Trommelen, 1997; Velotta, 1987). For example, an explicit warning for sleep medication would state that the patient must get eight hours of sleep (rather than "adequate sleep") between taking the medication and operating a car or equipment. Clear, easily interpreted information may be connected to the use of concrete (instead of abstract) language. In simple terms, concrete language refers to objects that can be experienced by the senses—that is, seen, touched, heard, etc. Abstract language, on the other hand, refers to intangible ideas, actions, and concepts. From a psychological perspective, concrete words "have single, bounded, identifiable referents," while abstract words "lack bounded and clearly perceivable referents, even if they might evoke situations, scenes, introspection and

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emotional experiences" (Borghi et al., 2017, p. 263). As a result, the meanings of abstract words can change over time or can be influenced by personal life experiences (Barsalou, 1987). In terms of communication, researchers have known for decades that concrete words are more memorable than abstract words (Brener, 1940; Epstein, 1962; Paivio, 1963). That tendency also extends to complete sentences, with people comprehending concrete sentences faster and storing them more completely in their memory than abstract sentences (Holmes & Langford, 1976). According to Paivio, Yuille, and Madigan (1968), concrete words also tend to correlate with higher ratings in *imageability*. In fact, imageability—which "is a psycholinguistic variable that is used to indicate how well a word gives rise to a mental image or sensory experience"—is so closely aligned with concreteness that numerous scholars have mistakenly used the two terms interchangeably (Rofes et al., 2017, p. 1). In reality, imageability is more like a scale, with some concrete words rating higher in imageability than others. Overall, however, concrete words are higher in imageability, and abstract words are lower in imageability (Borghi et al., 2017). This concept is relevant to warning signs because words with higher imageability ratings are believed to be processed faster and more accurately (Rofes et al., 2017).

Another way to make warnings more explicit—and, as a result, to at least marginally increase comprehension and compliance—is to use similes or metaphors in warnings (Bowles et al., 2002). When a warning includes information or details that are unfamiliar to the public, the information can be compared to details that the public already understands, which can increase both comprehension and recall (Harris & Mosier, 1999; Johnson, 1996). For example, a warning that states a "cell phone can initiate the combustion of some flammable gasses" or a warning that body parts "might be forcefully drawn into" a machine may be more effectively written as similes or metaphors, such as "This cell phone is like a match and causes flammable vapors to explode" or "the shredding device is a vacuum that might suck in body parts during operation" (Bowles et al., 2002, p. 1704).

## Complexity

Similar to explicitness, the complexity of the text influences how easily a warning can be read and understood. Complexity includes aspects such as voice (passive or active), syntax, and vocabulary (Leonard,

Creel, & Karnes, 1991; Main et al., 1993), as well as the positive or negative tone of the warning-sign language (Harris & Wiklund, 1989). For example, Velotta (1987) argued that warning messages should be written in an active voice with "strong auxiliary verbs" to "ensure that the message comes across forcefully" (p. 124). Moreover, threatening or even morbid terms (e.g., death or dismember) tend to attract more attention and to be more memorable (Harris & Wiklund, 1989). That said, threatening or morbid signs may be less likely to be posted by business owners who may fear their customers will be scared away (Harris & Wiklund, 1989). Based on that, it may not be realistic to expect private businesses to display signs with morbid language; however, such signs could still be useful in some tourism and public recreation spaces where serious risks exist. I argue that the number of separate or different messages that are communicated should also be factored into the complexity of a warning sign. For example, Cole et al. (1997) found that people can experience information overload when reading a sign with more than two messages. As a result, "attention per message and retention of message content both decline" (Cole et al., 1997, p. 69). Therefore, practitioners who are responsible for safety and risk communication in recreational spaces should select one or two important messages that need to be conveyed for the given context or environment.

## Hazard Information

A final characteristic of an effective warning is hazard information. This information can include multiple components. First, the warning should communicate the "severity" of consequences that may result if people do not comply with the warning (Wogalter et al., 1987; Wogalter & Barlow, 1990). For example, warnings related to viewing a solar eclipse should state whether staring directly at the sun would result in "temporary vision problems" or in "permanent eye damage and even blindness." Second, the warning should indicate the likelihood that a person will experience the hazard. The likelihood may be communicated explicitly (such as stating the number or percentage of victims) or implicitly (such as writing "will be injured" or "may experience injury"). Third, the hazard information should provide specific actions (as opposed to vague behavioral commands) that would help visitors avoid or mitigate the hazard. For example, Frantz (1994) found that the phrase "wear rubber gloves and protective glasses" was more

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effective than a warning that merely told people to "avoid contact with eyes and skin." That type of statement can help overcome situations in which people are unaware of specific actions they can take to help ensure their own safety. As Wachinger et al. (2013) argued, "it is not just a matter of raising risk perception but also of providing individuals with the physical and mental capacity to affect their own situation" (p. 1059). Fourth, I argue that "motivating" information should be included in a warning (Cornelissen, van Hoof, & van Vuuren, 2014). As Geller (2003, as cited in Saleh, 2011, p. 5) stated, when people understand why they should follow rules, they're more likely to be personally motivated. Including such information can also help ensure warnings are not overly technical (Herrero et al., 2002) or too focused on the organization's interests (Elling, 1997).

One caveat to hazard information (and warnings in general), however, is that people with alternative prior experiences (that is, people who have experienced or witnessed the hazard but not the negative consequences) may not believe the likelihood or severity of the risk—or even notice the warning in the first place—regardless of the warning's language (Godfrey & Laughery, 1984; Goldhaber & deTurck, 1988).

Based on the characteristics above, I argue that expository warnings are distinct from abridged warnings because they include most (but not necessarily all) of the aspects listed in Figure 3.

**Signal word:**
- ☐ "Danger," "Warning," or "Caution" (to convey serious risk/hazard)

**Length:**
- ☐ Longer text (to provide more facts/details regarding risk)
- ☐ 25- to 30-second reading time in areas people rest or expect signs
- ☐ 10- to 15-second reading time in areas where people are moving or not expecting signs

**Explicitness:**
- ☐ Concrete language (easier to comprehend and remember)
- ☐ Metaphors/similes (to explain unfamiliar concepts/terms)
- ☐ Imageability (words elicit mental image or sensory experience)

**Complexity:**
- ☐ Active voice and strong verbs (to ensure forceful message)
- ☐ Threatening even morbid words (more recognizable and memorable)
- ☐ Two or fewer different messages (to avoid information overload)

**Hazard statement:**
- ☐ Severity of consequences for noncompliance
- ☐ Likelihood/chances of experiencing hazard
- ☐ Ways to avoid/mitigate hazard
- ☐ "Why" information (to increase personal motivation)

**Figure 3. A checklist of common characteristics in expository warnings**

Although those characteristics provide a baseline for creating and even critiquing warning-sign language, this study extends previous research by focusing on the effectiveness of differing approaches to warning-sign language and how they impact the public's actual understanding of risks and application of the information, especially in recreational areas where people may unknowingly be exposed to risks.

## Methods

Specifically, this study tested the hypothesis that expository-warning language would result in the public being more informed about the risks and risk mitigation than abridged-warning language. Based on this hypothesis, I chose to conduct a large-scale, online survey using an open-ended question. Although other user experience research methods, such as usability or observation, might have been used to test the public's ability to perform tasks or study their interaction with warning signs, the goal of this study was to gauge people's perceptions and understanding of information conveyed by different versions of warning signs. Therefore, a survey was chosen because it provided one of the best methods for investigating user perceptions and for statistically describing segments of the population (Kuniavsky, 2012). In addition, aside from the demographic data questions at the beginning of the survey, this study focused on a single open-ended question: "In the space below, please describe in your own words what the sign above means to you." This open-ended question was chosen because it allowed "respondents to express their opinions in their own words," had the potential to "reveal unanticipated responses," and helped reduce researcher bias that could have influenced people to "answer toward an expected response or outcome" (Hughes & Hayhoe, 2008, p. 97). In that sense, this study is aligned with Grabill and Simmons' (1998) call for more qualitative research, such as surveys and interviews that include users in the construction of knowledge, as well as with Espiner and Weiss' (2010) use of surveys to study the public's interpretation of messages contained in signs posted in a national park. That said, the use of an online survey resulted in removing the participants from the original context of use—i.e., the national park setting with wide-open landscapes and potential distractions. That limitation will be discussed in the closing section of this paper.

# Expository Warnings

To test this study's hypothesis, two current Yellowstone National Park warning signs were tested. Yellowstone National Park's warning signs about bison provide a real example of two different approaches (one being an abridged warning and the other being an expository warning) that are currently being used at the same time and in the same national park. They also provide an opportunity to research warnings aimed at helping people understand and avoid hazards in tourism and outdoor recreation spaces where danger and risk may not be at the forefront of the experience. Because numerous factors influence a warning's effectiveness, aspects such as different images, colors, and so on were removed from the signs that participants were shown in order to test only the language. Additionally, the warning signs included in this study were intentionally designed using a similar, generic design—which helped focus the participant's perceptions and responses on the actual warning language (rather than font differences, etc.). Moreover, the warning-sign language that was tested was pulled verbatim from the actual warnings that are currently posted throughout Yellowstone National Park. While that enabled me to test actual warning language currently used in a tourism and outdoor recreation space, it did limit the types of signs tested to two extremes (a purely abridged versus a purely expository). That limitation will be discussed in the closing section of this paper. In the paragraphs below, I explain the two phases of the research—an online survey to collect data, followed by content analysis of the survey responses—in more detail.

## Online Survey

I administered an IRB-approved survey online from March 2016 through November 2016. Participation in the survey was completely voluntary and no identifiable information was collected. I recruited participants in two stages. First, I recruited students from college courses at a Midwestern university. Second, I recruited non-university participants via snowball effect by distributing the survey link to online connections (such as co-workers, family members, friends, etc.) and encouraging them to distribute the link to their contacts.

The online survey resulted in 303 completed responses. Approximately 55% were female and 45% were male. Although respondents ranged from 18

to 60+ years old, 64% were 18 to 29 years old at the time the survey was conducted. Finally, respondent education levels ranged from "some high school" to "graduate degree" (see Figure 4).

| | | Count | Percentage |
|---|---|---|---|
| **Gender** | | | |
| | Male | 135 | 44.5% |
| | Female | 168 | 55.5% |
| **Age** | | | |
| | 18-29 | 194 | 64.0% |
| | 30-49 | 53 | 17.5% |
| | 50+ | 56 | 18.5% |
| **Education** | | | |
| | Some high school | 2 | 0.6% |
| | High school graduate | 38 | 12.5% |
| | Some college | 105 | 34.7% |
| | 2-year college degree | 56 | 18.5% |
| | 4-year college degree | 53 | 17.5% |
| | Graduate school degree | 49 | 16.2% |
| **TOTAL** | | **303** | **100%** |

**Figure 4. Demographic profile of survey respondents**

Multiple-choice questions were used to generate demographic information. After completing the demographic questions, participants were randomly assigned to view one of two warning signs. In order to make sure other aspects (such as images, font size, color, etc.) did not influence the results, I tested two generic-looking signs featuring only the language that appears on two currently posted warning signs in Yellowstone National Park. In other words, the signs that were tested were intentionally shown with as little design or differences as possible to focus exclusively on the information conveyed through the wording, rather than color, images, etc. Although the two signs looked nearly identical in their lack of design, they did feature different signal words (one used "DANGER" and the other used "WARNING") because the language that was tested was taken verbatim from the actual signs. Simply put, the test signs featured actual language, rather than contrived or manipulated wording.

For the purposes of this paper, one of the warnings signs is referred to as the "expository warning" because it featured longer text with facts and details describing the size and speed of bison as well as loaded language, such as "gored" (see Figure 5).

The other warning sign is referred to as the "abridged warning," because it featured only an authoritative (yet vague) statement about not approaching bison (see Figure 6).

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**WARNING: MANY VISITORS HAVE BEEN GORED BY BUFFALO**

Buffalo can weigh 2000 pounds and sprint 30 miles per hour, *three times faster than you can run*

These animals appear tame but are wild, unpredictable, and dangerous.

DO NOT APPROACH BUFFALO

**Figure 5. An expository warning describing bison size, speed, and unpredictability**

**DANGER**

**DO NOT APPROACH WILDLIFE**

**Figure 6. An abridged warning featuring short text that lacked specific details**

The survey software randomly assigned participants—49.5% of participants viewed the abridged warning, while 50.5% viewed the expository warning. After viewing their assigned warning sign, participants were asked a single open-ended question: "In the space below, please describe in your own words what the sign above means to you." The answers were recorded by the online software and then analyzed (as described below) to determine how the different warning-sign language influenced respondents' comprehension of the risks visitors face when they encounter bison at Yellowstone National Park.

## Content Analysis

After the survey was closed, I conducted an analysis of survey responses to determine the public's comprehension of the warning sign messages. The results were analyzed in two phases. First, I analyzed all participant responses using software that identified common themes and word frequency. Second, based on

the frequent themes identified and an initial review of responses, I developed, tested, and then implemented a coding sheet based on Bloom's Taxonomy (Anderson et al., 2001; Bloom et al., 1956). Bloom's Taxonomy provides a hierarchy of cognitive processes "from simple to complex" (Krathwohl, 2002, p. 215). Specifically, the revised taxonomy (Anderson et al., 2001) uses verbs to describe cognitive processes in terms of remembering, understanding, applying, analyzing, evaluating, and creating—each with its own subcategories. Often, that hierarchy is used in education to "describe intended learning outcomes as the result of instruction" (Krathwohl, 2002, p. 213). Because the goal of this study was to analyze the public's comprehension of warning sign messages, the category levels used in the content analysis were based on the taxonomy of cognitive processes—in particular, the three lower levels were used because no evidence was found of the higher-level processes. However, the exact terms were changed for this study to better align with the context of this survey and to better categorize the types of responses. For example, even though participants did not actually "remember" information (because it was still visible to them during the test), many participants repeated key words. That repetition would not accurately be termed "remembering," but it would still align with the verbs often associated with that level, such as *duplicate*, *list*, and *repeat*. In Figure 7, I summarize the categories and characteristics that were used for this study's coding.

| Type of response | Demonstrated level of learning | Related taxonomy term | Example from survey responses |
|---|---|---|---|
| Repeating response | Recognizes key terms but merely repeats or lists those terms | Remember | *Do not approach wildlife* |
| Rephrasing response | Demonstrates basic understanding of the information by rephrasing or summarizing key concepts | Understand | *Wildlife may be near, and could be hazardous to my being* |
| Relating response | Demonstrates thorough understanding by relating the information in new ways (such as specific situations or actions not originally described in the warning-sign language) | Apply | *Animals in the wild can be dangerous if they're not used to having people around so you should not go up to them or try to pet them* |

**Figure 7. Three categories were used to code the types of responses. Each category was related to a taxonomy term and level of learning.**

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Using those categories, I conducted a content analysis of all survey responses. After my coding was completed, I recruited and trained a second coder (who was not familiar with the study's purpose) on using the categories to code a random sample of 10% of the responses. After the coder completed the analysis, a reliability test was conducted using Cohen's kappa with quadratic weighting, which indicated an acceptable correlation (0.8148) between my results and the second coder's results.

## Results

Of the 303 responses that were collected using the online survey, 12 were removed from the study because the responses did not actually relate to the survey's question (e.g., when asked to describe what the warning sign meant, one participant wrote: "You do not have to try"). Of the 12 removed responses, six were from participants who saw the abridged warning, and the other six were from participants who saw the information sign. The removal of those responses left 291 responses for analysis (144 related to the abridged warning and 147 related to the expository warning). Those responses were analyzed using software (which focused on common themes and word frequency) and, as a result, two key findings regarding the content and language were uncovered. First, people who viewed the expository warning were more likely to focus their responses on maintaining a safe distance than people who viewed the abridged warning ($p = .039$). Second, people who viewed the abridged warning were more likely to use abstract or vague terms (such as "harm" or "hurt") to describe the consequences of disobeying the warning ($p = .029$), while people who viewed the expository warning were more likely to use concrete, descriptive (even morbid) terms (such as "kill" or "gore") ($p = .002$).

The responses were also analyzed using the content analysis categories (i.e., repeating, rephrasing, and relating) described above. Overall, approximately two-thirds of all responses consisted of rephrasing or summarizing key concepts from the signs (but without elaborating or applying the information to new or specific situations), such as: "Wildlife may be near, and could be hazardous to my being." Those types of responses demonstrate a basic understanding of the information. After analyzing the rephrasing responses, I determined there was no significant statistical difference between the rephrasing responses by participants who viewed the abridged warning as compared to participants who viewed the expository warning. In other words, regardless of which sign was viewed, two-thirds of all participants demonstrated a basic level of comprehension that could be categorized as "understanding" in Bloom's Taxonomy.

Although that may at first appear that each sign effectively communicated the risk to the public, it is important to remember that the goal of warning signs is to "alert and inform" the public about "potential hazards, so people can act to avoid the consequences" (Ayres, 2013, p. 1698). In that sense, an effective sign would result in participants demonstrating a thorough understanding of the risks as well as the ability to relate the information to specific situations or actions that were not originally described in the warning-sign language, so that people can actually avoid risks and consequences. Based on that emphasis, my findings uncover two significant differences between the warning signs tested. First, participants who viewed the abridged warning were more likely to merely repeat key terms, which correlated with the lowest level of learning and comprehension in Bloom's Taxonomy ($p = .001$). In fact, 25% of people who viewed the abridged warning provided a "repeating response," compared to only 9% of those who viewed the expository warning. For example, one participant wrote: "Do not approach wildlife." Those types of responses demonstrate that the participant was able to recognize important words from the warning; however, the participant did not demonstrate enough understanding of the information to either rephrase it or to apply it to a different or more specific situation. Second, participants who viewed the expository warning were more likely than participants who viewed the abridged warning to provide a "relating response" (the highest level of learning and comprehension in this study), which demonstrated a thorough understanding of the sign's message by applying the information to new situations or specific actions ($p = .006$). Specifically, 20% of participants who viewed the expository warning provided a "relating response," compared to only 8% of participants who viewed the abridged warning. For example, one participant wrote: "Animals in the wild can be dangerous if they're not used to having people around so you should not go up to them or try to pet them." In

that response, the participant demonstrated thorough understanding of the warning sign information by relating it to specific situations or actions—i.e., "you should not go up to them or try to pet them"—that were not originally described in the warning-sign language. In the discussion below, I relate those findings to the characteristics of effective warning signs.

## Discussion

The warning signs tested in this study provided contrasting tactics for warning the public about potential dangers: one abridged warning and one expository warning. Although they differed significantly in their language, they did share one similar aspect: the use of signal words. Both signs provided strong, attention-getting wording near the top of the sign. The abridged warning featured the word "danger," while the expository warning featured the word "warning." Although researchers disagree about which word may be more effective (Braun & Silver, 1995; Leonard et al., 1986; Wogalter, Jarrard, & Simpson, 1994; Wogalter & Silver, 1990), the fact that both signs include a signal word means they are likely to be more effective at highlighting a threat than they would if the signal words were absent (Wogalter et al., 1994). The use of signal words, however, is where the similarities end.

In terms of length, the expository warning featured longer text, which the public is more likely to read (Leonard et al., 1989; Silver et al., 1991), while still remaining short enough to be read in the 10 to 15 seconds that park visitors would be willing to spend on a sign posted along trails or boardwalks (Hughes & Morrison-Saunders, 2002). The expository warning was also more explicit than the abridged warning because it provided clear and detailed information, which increases the chances that people believe the situation is hazardous (Laughery et al., 1991; Laughery et al., 1993; Laughery & Stanush, 1989; Rhoades, Frantz, & Miller, 1990; Trommelen, 1997). Although the expository warning did not include an actual metaphor, it provided an explicit comparison of a bison's speed to information the public already understands (i.e., the speed of humans), which can increase both comprehension and recall (Harris & Mosier, 1999; Johnson, 1996). That comparison also makes the warning "more specific to the individual," which can increase the likelihood that readers will accept and

comply with the warning (Williams & Noyes, 2007, p. 21). The expository warning also aligned with the characteristic of complexity because it used the active voice, understandable yet precise vocabulary, and even a negative (possibly morbid) tone—all of which can attract more attention and be more memorable (Harris & Wiklund, 1989; Leonard et al., 1991; Main et al., 1993). Finally, unlike the abridged warning, the expository warning featured hazard information, including information about the severity of non-compliance and likelihood of the hazard (Wogalter & Barlow, 1990; Wogalter et al., 1987). That said, the expository warning (and the abridged warning for that matter) could be more specific or concrete in stating actions to avoid or mitigate the hazard (Frantz, 1994).

Based on that comparison, it is not surprising this study's findings confirmed the hypothesis that more expository-warning language may result in people more thoroughly understanding the risks in a public recreation or tourism space as well as how to avoid or mitigate such risks. When the survey responses were analyzed using terms related to the levels of comprehension and critical thinking in the revised version of Bloom's Taxonomy (Anderson et al., 2001; Bloom et al., 1956), this study's findings indicated that people who viewed the expository warning sign were more likely to be able to "relate" the information, which demonstrated that they understood the severity of the risk and could apply the information to new situations they may face or specific actions they should or should not take when visiting the park.

## Implications and Future Research

Broadly speaking, this study's results lead to an important conclusion regarding warning-sign language: People who view longer, more detailed expository warnings may be more likely to understand a situation's risks and consequences as well as how to avoid or mitigate them. That conclusion is based on data indicating that the people who viewed expository warnings were more likely to focus on maintaining a safe distance from potential hazards, to use vivid (or even morbid) terms to describe the consequences of disobeying the warning, and to obtain a higher level of understanding—akin to the third level of Bloom's Taxonomy (i.e., apply). In contrast, the people who view abridged warnings may be more likely to have a

## Expository Warnings

limited understanding of the risk—akin to the lowest level of Bloom's Taxonomy.

Because the ultimate goal of a warning sign is to actually "alert and inform" the public about "potential hazards, so people can act to avoid the consequences" (Ayres, 2013, p. 1698), warning signs in certain contexts (such as locations where people have time to read and where detailed information is necessary to understand unfamiliar risks) should feature expository warning-sign language as opposed to vague abridged warnings. For example, rather than merely command the public with a sign that reads: "Do Not Swim" or "Do Not Approach," effective warning signs should include explicit details, such as the source of the hazard, safe distance required, severity of consequences, likelihood of injury, ways to mitigate harm, and even metaphors or concepts that help the public process the information in terms of ideas they already understand. After all, if the Disney resort sign had included wording similar to the tragedy's report's language—that is, "Alligators routinely hunt and kill prey *along the shore* and drag it into the water" (emphasis added, Florida Fish and Wildlife, 2016, p. 12)—the parents of the two-year-old victim would likely have had a much better idea about the danger that lurked just a few feet away from their child.

This study's findings are relevant to a number of people working in risk communication. Teachers of business and professional communication can apply the findings to help students critique and create more effective warning signs—especially in tourism and outdoor recreation spaces where people may not be expecting danger, such as parks, community events, and even public tours of workplaces. Suggestions include field trips to public recreation spaces, document design assignments related to warnings and risk communication, and even partnering with a local park to create and test warning signs as part of a service-learning project.

Practitioners who are responsible for visitor safety in public recreation and tourism spaces can use this study's findings—in collaboration with Wogalter, Conzola, and Smith-Jackson's (2002) summary of evaluation techniques—to identify inadequate warning signs that are currently in place (before an injury occurs) as well as to develop and test more effective warnings signs based on specific aspects (such as the common characteristics provided in Figure 3 above). In doing so, care should

be taken to consider the context and time required to read the warning. For example, in an area where visitors frequently rest or where they expect to read information (such as visitor centers), longer expository warnings may be used as long as they can be read within 25 to 30 seconds (Cole et al., 1997; Hughes & Morrison-Saunders, 2002). Although this study focused only on public recreation risk warnings, practitioners who are responsible for safety in dangerous workplaces may consider testing similar expository warnings in areas where employees rest or have more time to read warnings, such as breakrooms or in changing areas.

Finally, researchers can use this study's findings to examine additional nuances of warning-sign language. First, this study focused on testing the content of warning signs rather than the context. As Albers (2012) explained, the content focuses on the "actual words . . . which are presented" to the public, whereas the context focuses on the "real-world situation" in which "information gets presented" including "mitigating factors within the information presentation, social interactions, and overall environment" (p. 7). In other words, this study provided data regarding effective warning-sign language in isolation. Future studies should test these findings further in actual public recreation spaces where risks as well as distractions are present. Suggestions include field studies to observe visitors and track differences in noticeability, reading time, and compliance as well as follow-up surveys or interviews to confirm if this study's findings hold true in a natural setting. Such research would be in line with Grabill and Simmons' (1998) call for more qualitative research methods.

Second, because this study focused specifically on language, other aspects (such as images, color, font size, etc.) were removed from the test. Doing so enabled me to test the effectiveness of the wording by itself; however, it limited the results to language-only signs with limited design. Future studies could test the usage of images, color, etc. combined with expository and abridged warning-sign language to determine if this study's findings regarding effective wording are supported when the text is not the main or only way in which visitors obtain risk information.

Third, this study tested actual warning-sign language that is currently used in a national park where people gather near potential risks. While that enabled me to test realistic (rather than contrived) warning

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language, it limited the warning sign scenarios to two extremes (a purely abridged versus a purely expository). Future studies might consider abridged warnings and expository warnings less as a rigid dichotomy and more as a spectrum. Researchers could test signs that feature varying degrees of middle-ground language (such as short yet concrete text that conveys one concise fact or shorter text that includes more morbid terms or metaphors). For example, a warning sign at a public pool might use language that reads: "WARNING! No Diving! Shallow Water. Crippling injuries may result from diving." That type of language would include aspects of the expository warning (i.e., a signal word, slightly longer text with facts/details, two or fewer different messages, "why" information, threatening or morbid terms, appropriate length based on reading time and contextual expectations, etc.) in a slightly abridged format.

Finally, future research could focus on different populations, such as gender differences, age differences, and alternative prior experiences. Such studies could be conducted in combination with the field research suggestion above to collect data on the influence that mitigating factors and that different warning-sign language options have on various populations. The results of such studies could help scholars and practitioners better understand how to communicate to different target populations in recreational spaces that are designated for specific segments of the population.

Note: This study was approved by the Institutional Review Board of St. Cloud State University.

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# Sounding Off: Toward a Rhetoric of Sound in Technical Communication

By David Wright

**Abstract**

**Purpose:** As digital media continue to proliferate into every aspect of our lives, sound is playing an ever-increasing role in the conveyance of information. Because digital messages via the Internet, cell phones, smart devices, and personal devices are typically shorter and more direct than traditional text-based communication, digital communication will necessarily improve via other, less textual cues. Visually, we already see this through the use of digital cues, such as emojis and graphical displays (e.g., GPS charts). But digital communication, in the future, will gain much from the expanded use of sound. As yet, no analytical framework for classifying sound in technical communication has been established.

**Method:** The author revisits some historical uses of sound in technical communication before proposing a model for analyzing current and future sounds.

**Results:** Tools that encompass signaling, linguistics, paralinguistics, extralinguistics, and rhetoric can be used to analyze complex sonic combinations and to generate new sounds for technical communication.

**Conclusions:** A first model is proposed along with recommendations for the future.

**Keywords:** technical communication, sound, linguistics, historical sound, sonic rhetoric

**Practitioner's Takeaway:**

- Presents a discussion of sound as technical communication in historical context.
- Discusses linguistic properties and rhetoric as they pertain to sound in technical communication.

- Proposes a first tool for use in analyzing and creating sounds for technical communication.

# Toward a Rhetoric of Sound

## Sounds of the Past

Historical study allows us to see where we come from, but it can also illuminate the present and point the way to the future. As Malone (2007) writes,

> The earliest justifications of such studies were that they help to legitimize the field by showing that it has a history and that they validate current practices. There will always be a place for these kinds of studies, especially as we venture into new areas, such as the history of previously unexplored forms of nonverbal technical communication. (p. 343)

There is a long history of nonverbal technical communication, although most technical communication research on the subject has been limited in scope. While the forms and functions of sound in technical communication have varied over time, the fact that sounds have long been used to convey technical information is undeniable. Ancient construction projects were often directed and controlled through sound, allowing engineers and building supervisors to control and coordinate efforts over large project areas. As Sawyer (2015) notes, even ancient fortifications in China, often built by hand and backbreaking labor, were controlled by sound, including horns and drums. For example, the work of building the Chou dynasty capital was "not only supervised, but also controlled by the beat of a drum" (p. 55). Chinese states developed complex signaling systems to warn of the impending arrival of enemy troops, among other things. Similarly, Chanta-Martin (2015) discusses African "talking drums" in terms of their ability to disseminate coded messages to recipients that often included complex instructions.

Later, in medieval times, as Corbin (1998) and Arnold and Goodson (2012) show, bells had a profound effect on the lives of ordinary European townspeople by marking the hours of the day, calling people to worship, ordering assembly, or calling the militia to arms. In effect, controlling the loudest sound within a community allowed one to largely control the community. Arnold and Goodson (2012) refer to bell ringing as a form of "shorthand" (p. 112), which directed Christian life by the twelfth century; the authors note that the bells were so intertwined in

Christian traditions that they were collected as trophies by Muslim armies and created a new industry devoted to bell design and manufacturing.

Other musical instruments have been widely used as a means of communication as well. Historically, the bugle is perhaps the most prolific musical instrument used for communication, especially in the military. Although the bugle is a relatively simple instrument, it has much more communicative range than might be expected. As an article in the *St. Louis Globe Democrat* circa 1885 states,

> The language of the instrument is not at all limited. A language with only five words may be thought easy to learn, and yet the different arrangements of these 'words' ('sentences,' as I may call them) are endless." (Bugle Calls of the English Army, 1885, p. 7)

As Powels (2002) shows, by the time of the Civil War, the bugle was well entrenched in military life and maneuvers:

> During the Civil War, as in conflicts through the centuries, military orders were often communicated through the use of various musical instruments. The most common instruments were the drum and the bugle, whose distinctive sounds could be clearly heard on a battlefield. At the outbreak of the Civil War, the U.S. Army had dozens of bugle calls to direct tactics and regulate the lives of the soldiers. (p. 10)

When armies of the Civil War were preparing for movement, separate bugle calls announced that the infantry should prepare to move, that companies should form a line in their camp streets, and that individual companies should move onto the highway. When in camp, the bugle called for breakfast, drill, and every other important activity of the day. Artillery and cavalry brigades were no different. Each responded to bugle calls of their own, and their horses soon knew the calls of the bugle as well as their riders.

The *Milwaukee Sentinel* reports (1895) that Lieutenant Brewer's troop of the 7th Cavalry had mastered the "Cossack Drill," using bugle calls to signal horses to lie down with their riders and rise again, to form breastworks and allow their riders to fire over the

top of them, and to carry their riders standing up in the saddle. So trained to the bugle calls and their routine were they, that several of the horses and riders were "granted leaves of absence to perform in Buffalo Bill's Wild West Show at the World's Fair" (p. 3). Similarly, in discussing the U.S. Cavalry's Troop F of the 3rd Cavalry in 1897, the *Boston Daily Advertiser* reports that commander Captain Dodd was able to lead his 58-member cavalry through a 35-minute "music drill," consisting of complex maneuvers, dancing horses, and sabre touching by mounted troops, without a single verbal command. Accompanied by the army band, the cavalry members and their mounts were signaled only by a series of bugle calls designed to indicate changes in their elaborate routine.

## Sounds of the Present

Modern military units use PA systems, radio, satellites, cell phones, and all manner of technological "gadgetry" to control troop movements both in training and on the battlefield, but, even now, the United States Coast Guard maintains extensive maneuvering and warning signals that mimic bugle calls through shipping horns. There are even separate codes for international and inland shipping, and some signals are specifically for vessels in sight of each other such as,

- one short blast to mean "I am altering my course to starboard";
- two short blasts to mean "I am altering my course to port";
- three short blasts to mean "I am operating astern propulsion".

Other signals are specific to narrow channels, such as:

(i) a vessel intending to overtake another shall in compliance with Rule 9 (e)(i) indicate her intention by the following signals on her whistle:
- two prolonged blasts followed by one short blast to mean "I intend to overtake you on your starboard side"
- two prolonged blasts followed by two short blasts to mean "I intend to overtake you on your port side"

(ii) the vessel about to be overtaken when acting in accordance with 9(e)(i) shall indicate her

agreement by the following signal on her whistle: one prolonged, one short, one prolonged and one short blast, in that order. (U.S. Coast Guard Rule 34: Maneuvering and Warning Signals, para. 1–5)

In civilian lives, numerous sounds alert us to danger or provide us with information. From a young age, children learn to associate sounds with information. Older individuals may remember toys such as the classic "see and speak" that taught us to associate sounds with animals or, for more adventurous types, games like "Operation" that teach children motor skills with "negative" sounds representing improper movements. Today, sounds accompany video games, offering reinforcement for success and often signaling impending danger.

As adults, everyday activities, like crossing the street, are often accompanied by sounds such as beeps that let us know we can cross, and we become accustomed to processing auditory information as technical information. Forklifts make certain sounds when they back up, alarms sound when an item leaves a store without scanning, car horns and sirens alert us to danger and emergencies, and more annoying sounds, like cell phone ringtones and email alerts, tell us that our attention is required. In fact, ringtones, in particular, have become so ubiquitous that one can hardly visit a restaurant or grocery store within hearing their constant call. This list is virtually endless. Commercials, sirens, text message alerts, and the like constantly vie for our attention and send us sonic information. Similar examples can be found all over the world. Historically, Native Americans used drums extensively in religious ceremonies and continue to use them to enhance social gatherings to this day. And in other parts of the world, such as Turkey, drummers have moved through the streets for centuries before dawn during Ramadan to signal the morning meal before fasting begins at sunrise and to wake people up.

While the full measure of historical and current sounds used to communicate technical information is beyond the scope of this article, a few examples like these show that technical communication has been and continues to be delivered through sound. However, in order to properly analyze sonic messages; which often incorporate a variety of tonal, musical, and linguistic properties; we must consider them from multiple perspectives.

# Toward a Rhetoric of Sound

## Sound as Plain Language

Britton's (1965) reference to the bugle call as a metaphor for technical communication with one unambiguous meaning was an early attempt to define the discipline. But Britton's article is over 50 years old, and technical communication scholarship has largely moved on from his somewhat simplistic description. Nevertheless, sound is capable of conveying complex messages quickly, plainly, and effectively, as shown by its use in historical construction and military affairs. Britton believes that scientific and technical communication can be recognized and judged on the basis of that effectiveness, saying that, "scientific analyses and descriptions, instructions, and accounts of investigations quickly reveal any communication faults by the inability of the reader to comprehend and carry on" (p. 116). But, in using the bugle as a metaphor for communication with clear meaning, Britton overlooks the fact that the signaling function of the bugle, rather than the use of a musical instrument, made the bugle so successful. Virtually any sound can be used as a signal, provided the signaler and the listener possess a shared understanding of its meaning.

Britton's (1965) publication was a precursor to the plain language versus rhetorical humanism debate among technical communicators. Typically, this argument centers on the nature of technical communication and what place rhetoric and humanism have in such communication. While that argument is beyond the scope of this article, scads of sources can be located on the subject. Some authors (Katzoff, 1964; Rathjens, 1985; Petelin, 2010; Stewart, 2010) have argued for the merits of plain, unambiguous language, while others (Miller, 1979; Dobrin, 1985; Sanders, 1988; Rutter, 1991; Tebeaux, 1991) have argued in favor of a more rhetorical approach to communicating technical information.

Regardless, Britton's (1965) failure to identify its signaling function as the source of the bugle's clarity shaped that debate into one over message content, rather than one focusing on the medium of delivery, sound, which has clearly been used throughout history to convey precise technical information. Sound's ability to do so, while simultaneously incorporating rhetorical properties, is precisely why sound has such potential for technical communication.

In fact, even Britton notes that there are complexities and aesthetics to sounds made by the bugle that impart a range of emotions. I suggest that most authors, whether they openly profess to be on one side of that debate or are simply perceived to be on one side, would admit that some degree of plain language, rhetoric, and humanism are all key ingredients for good technical communication. As with all things communication, the amount of each ingredient is dependent upon the circumstances.

## Sound as Rhetoric

Rickert (2013) discusses ambiance as a rhetorical factor. He compares ambience to the fermenting of wine, with many factors influencing its flavor (soil, sun, etc.). In addition, the flavor is further affected by the company and setting in which it is consumed. Rhetoric, then, according to Rickert, should be considered among all of its influences if we are to better understand it and become better rhetors. Sound and music are among these influences and are, in turn, influenced, much as the wine mentioned previously, by their surroundings.

In the same way, words are not just markings on a page to be interpreted solely as factual information but are both an influencing factor and simultaneously influenced by their surroundings, or the ambiance of their environment. As Goodale (2011) says, "Even when we study speeches or the lyrics to popular songs, we rarely study the sounds of voices and music. Rather, we convert sounds into words on a page . . . And yet, we learn from taste, touch, smell, and sound as well as from sight" (p. ix). Goodale cites F.D.R.'s famous inaugural address (all we have to fear . . . ) as evidence of sound's impact on information but laments the fact that the text of the speech is now most often separated from the sounds that accompanied it, in essence, the from the voice inflections and the speech's surroundings and the ambiance that Rickert identifies. Indeed, silently reading the speech does nothing to capture its true effect upon listeners.

This sonic rhetoric becomes even more pronounced when words are replaced by sounds, as has become more common with our increasingly digital existence. Technology companies recognized this fact years ago. As Rickert (2013) points out, no obvious need warrants the Windows operating system startup music. In fact, it serves no obvious function other than to

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signal that Windows has started. Rickert points out that this apparent lack of sonic function is often used to dismiss rhetoric as "persuasive, or seductive but in the end unimportant" (p. 131). This argument, which dates back to Plato, casts rhetoric as an impediment to transparency. In response, Rickert points out that something must be amiss when music and sound are "described simultaneously as powerful, indeterminate, and inessential" (p. 132). Further, he argues that a true understanding of rhetorical appeals must account for their transmission through nonverbal and ambient means.

Technology companies, at least, seem to agree. Why else would Microsoft have hired Brian Eno (of Beatles production fame) to create the Windows startup music, investing literally millions of dollars? It is tempting to answer this question sarcastically, because of the corporation's wealth. But Rickert (2013) shows that Microsoft "wanted a piece of music not just to evoke an experience of using its operating system but to tailor it in specific ways, in essence, that is, to situate a user's emotional frame of reference according to certain parameters" (p. 134). This is clearly a rhetorical strategy based on sound.

Cell phone sounds have taken on similar form. Far from the old bells of the medieval church and landline telephones, ring tones, text message alerts, and the like have evolved into personalized statements that tell us about people, their loyalty to subcultures (de Vries and van Elferen, 2010), who is calling, and whether we want to answer before the phone is ever out of our pocket. In fact, some researchers even equate ringtones with self-identity formation and projection (Schneider, 2009). When a friend's phone recently rang, I immediately recognized the tone as the Empire's theme from *Star Wars*. When I inquired as to the purpose of that particular tune, he said it signaled his office was calling (in a disgusted tone) without ever looking at the phone.

Even traditional sounds, such as African drum beats, are not purely informational but evoke an emotional response that "becomes the impetus for motion that compels action to get things done in the rhetorical situation—solving problems or celebrating an occasion or event" (Bokor, 2014, p. 184). These emotions, combined with the implicit information provided by the beat of the drum, become a surrogate for speech and body language by providing, "the junction between human speech (serving as a surrogate

form) and body motions (resulting from its impact on the audience)" (p. 175). The beats are chosen for a specific purpose and for a specific situation. Thus, the questions surrounding communication via sound should concern not only their signaling function but which types of sounds are being paired with specific circumstances and, perhaps more importantly, who is choosing those sounds and for what purpose. When cell phone users choose a specific ring tone for a specific caller, for example, they control those sounds and, at least to some degree, the rhetorical effect of those sounds. When others choose, however, users may be unaware of their impact or, at the very least, subject to unwanted influence.

For example, slot machines have greatly expanded their use of sound since their evolution in the early 1900's. Rivlin (2004) shows that, until the early 1990's, the original sounds (ringing bells to signal winning) had changed very little but that since that time, the average number of sounds on a slot machine has increased to over four hundred. Dixon et al. (2014) found that those sounds are used to both psychologically and physiologically affect slot machine players, making them prefer both to play machines with upbeat, "winning" sounds and to believe that they are winning when they are not. In later research, Dixon et al. (2015) showed that sounds were directly responsible for reinforcing losses on slot machines to the point that players thought they were winning when they were actually losing.

Therefore, sonic analysis for technical communication must incorporate not only types of sounds but also their rhetorical purpose and the source of their design. It is tempting to dismiss the rhetorical dimensions of sound as something apart from technical communication, but, much like textual information, it is nearly impossible to separate the rhetorical effects of sound from their signaling functions. This is especially true if the sound in question progresses beyond a simple beep. Similarly, it is tempting to dismiss the linguistic properties of sonic communication, but the very meaning and persuasive appeal of sound depends upon paralinguistic functions associated with those sounds. Thus, to be understood as a facet of technical communication, sound must be viewed from an interdisciplinary perspective. Linguistic, paralinguistic, and extralinguistic communication, along with rhetorical appeals, are critical to understanding sonic technical communication.

# Toward a Rhetoric of Sound

## Linguistic Communication

As a form of audio communication, linguistic communication probably requires the least explanation. We are all accustomed to communicating verbally. While there are tomes of linguistic research concerning verbal communication, for the purposes of a rhetoric of auditory technical communication, there are two main sources: the human voice and machine voices. Much of today's communication is simply digital audio. Phone answering machines still announce the number of messages awaiting playback, for example. Smart home products are also increasingly vocal in their presentation of information. Amazon's *Echo* is a good example of a digital machine that communicates linguistically. There will be many more in the near future as our homes and offices become smarter and interact with us concerning a range of environmental controls. A second source is the recorded human voice. Commercials, presentations, and training materials are some examples of recorded voices in action. Regardless, both sources are designed to deliver scripted information, and even computer-generated linguistics are designed to mimic the human voice.

## Paralinguistic Communication

Of more interest as a tool for sonic rhetoric in technical communication is paralinguistic communication, which can best be described as a manner of speaking to convey particular meanings. In conversation we routinely process voice inflection, non-linguistic noises, facial expressions, body language, hand gestures, and a host of other signals to more accurately identify meaning. People depend on these cues to understand both the meaning of speech and the speaker's emotional state (Siegman, 1978). But most conversational cues are dependent upon interpersonal proximity. In order to distinguish those cues, we must be in close proximity to the speaker. If we remove that proximity from our communications, we must do without those signals, which is why sarcasm is so poorly reflected in emails and the reason that the written phrase "that's impossible" may mean many different things. The meaning of the phrase is dependent upon the context of its delivery, vocal expression, and which words are emphasized.

In *Reading Sounds: Closed-Captioned Media and Popular Culture* (2015), Zdenek refers to paralinguistic speech sounds as either "Paralanguage"—sounds made by speakers that either can't or shouldn't be described as distinct speech—or "Manner of speaking identifiers," which describe a speaker's distinct way of pronouncing words (p. 39). As he shows, these two types of non-speech identifiers are used in closed captioning to directly offset the lack of paralinguistic cues (such as grunting noises or sarcastic speech) created by silence. Zdenek also shows that extracting those cues from other (linguistic) captioning reveals patterns that can be easily missed (p. 47), and that "captioning is the difference between understanding and misunderstanding" (p. 70). We are dependent upon paralinguistic cues and their delivery patterns for accurate communication. Without them, we are missing part of the message. Complete compensation for the missing cues, even by other means such as closed captioning, is difficult.

Fortunately, both writing and sound can be delivered without proximity, which is precisely why both have been so historically valued. Sound, in addition, can embody rhetorical elements that articulate emotion and stimulate action via auditory cues that move beyond textual word choice. Furthermore, music and some musical instruments, in particular, have an extended sound range and the same ability to impart emotion as has the human voice. Sounds can effectively mimic many emotional properties of the human voice and were, in fact, designed to do so, as the human voice is the original musical instrument.

For example, anxiety and stress tend to accelerate speech, while depression tends to slow speech and results in more pauses. Part of the study of prosody concerns describing vocal variations that accompany speech and help to convey meaning. Bhatara, Luakka, and Levitin (2014) state that "In social interactions, we must gauge the emotional state of others in order to behave appropriately. We rely heavily on auditory cues, specifically speech prosody, to do this" (p. 1). Leathers (1997) identifies nine different parts of vocal sound that can be consciously controlled, including loudness, pitch, rate, duration, quality, regularity, articulation, pronunciation and silence (p. 13). These, in turn, are manipulated by the speaker to manage impressions, manage emotions, and to regulate communication.

But we do not automatically recognize these cues. As Knabb, Hall, and Horgan (2014) state, "Most of our ability to send and receive nonverbal signals is derived from 'on-the-job-training,' the job being the process of daily living" (p. 61). We are trained over time to distinguish the

sounds and their meaning, both through direct training from others and by watching what others do in response to those sounds. Despite the fact that these sounds may originate from a different culture, we are typically able to learn to decipher them relatively quickly (Collett, 1971).

We do the same thing with non-linguistic sound and, in fact, impart the inflective cues that we have learned from speech onto sonic stimuli. We associate slow, tonally low sounds with sluggishness and depression, for example. Paquette, Peretz, and Belin, (2013) show that listeners of a prerecorded set of musical "bursts" were able to identify the correct emotional state associated with the musical piece (happiness, fear, sadness, neutrality) at a rate of 80.4%. Finally, Scherer (2001) played vocal portrayals designed to convey specific emotions for listeners from nine different countries and found that similar emotional inference rules across cultures, even though the native languages of the listeners varied.

The rhetorical advantage of such uniformity across cultures is that music and paralinguistic influence are predictable. The disadvantage, if there is one, is that the same sophistical applications of paralinguistic cues have been available since Aristotle's time and have not always been used for ethical purposes. As our digital environment continues to evolve, auditory cues will become increasingly important, as will sound-producing devices and paralinguistic cues.

## Extralinguistic Communication

In addition to paralinguistic communication, extralinguistic communication affects our perception. Extralinguistic communication is best defined as sound that affects communication apart from language. Or, as Zdenek (2015) calls them, "sound effects" that do not emanate from vocal chords (p. 39). Background music is undoubtedly one of the most prolific examples of extralinguistic communication. Advertising is replete with sound as a means of conveying mood and rhetorical intent, as are movies and other types of digital recordings. Pharmaceutical ads offer a quick glimpse into the type of extralinguistic communication that dominates much of our daily media.

A commercial for a depression medication might, for example, start with a discussion of life before the drug, complete with somber music, while the second half of the commercial often features a revitalized

person and a much livelier soundtrack. Product branding also routinely involves both music and narration to create a feeling about a particular product or service. For example, ASPCA advertisements feature slow, sad, piano music coupled with emotionally charged narration and voice inflection. The purpose of this combination, of course, is to use pathos to draw us into the suffering of the animals. On the other end of the spectrum, a recent advertisement for a psoriasis medication features quicker, more energetic narration coupled with Fleetwood Mac's "Go Your Own Way" as background music to impart a feeling of excitement and freedom. We are all aware of these manipulations when we stop to think about them, but we generally accept them as part of communication without much thought.

However, imagine the Windows startup sound being the *Price is Right's* sound for losing (http://www.orangefreesounds.com/price-right-losing-horn/). We know immediately, as Paquette, Peretz, and Belin, (2013) show, that this is not an appropriate sound and that it is meant to signify a negative outcome. Our "on-the-job-training" sees to that. But much like paralinguistic sound, many of the rhetorical qualities of extralinguistic sound are subtler, and their effect depends upon why they are being put to use and by whom.

## Silence

Music's original alternative, silence, functions much like white space in a document. White space is a break from the narrative, a signal that we are moving on to a new topic or section, hence the reason for silence between chapters in audio books. Rhetorically, however, silence can mean a range of things. Silence while playing a slot machine, for example, is indicative of nothing happening. It is a removal of the audio reward system designed to keep players upbeat and convinced of their monetary progress. Only by playing additional money can the sounds be recovered. But silence can also be used for emphasis. Silence is sometimes most effective in audio as a break, after a salient point has been made, much like white space in a written document.

## Toward a Model for Anaylyzing Technical Communication Sounds

By combining the rhetorical and linguistic properties of sound with its function as a signaling device, we

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can begin to analyze more complex combinations of sound. Many of the sonic messages we hear today are but part of an overall message that may also include textual and visual elements. Nevertheless, sound is part of the message and is often ignored. Whereas a single musical instrument or sound can be used to transmit instructions or alert us to a new condition, our digital lives encompass increasingly complex combinations of sounds, including the human voice, machine voices, recorded sounds, designed sounds, and music. Tools must be developed to analyze and classify those combinations and to aid in developing new sounds.

Some work in classifying elements of sound does exist. For example, Ephratt (2009) presents the following table concerning auditory communication as part of the five senses that serve overall communication (Figure 1). In doing so, he includes linguistic, extralinguistic, and paralinguistic communication.

These categories are useful as a part of technical communication auditory analysis. However, as a technical communication tool, any such model would need to include a more interdisciplinary approach. One possible approach is shown below (Figure 2).

It may seem unnatural, at first, to connect linguistic, paralinguistic, and extralinguistic qualities

**Figure 1. Ephratt's table of the five senses in auditory communication**

| Body/Senses | Human Body Exclusively | | | Beyond the Human Body | | |
|---|---|---|---|---|---|---|
| Acoustic/ Auditory | Symbol pure sign | Index pure + function | Icon | Symbol pure sign | Index pure + function | Icon |
| | Language "verbal" (including prosody) | Sounds; qualities; voices and sounds other than words -paralinguistic | sound reflexes: cry, yawn, digestion, and other body sounds | Musical instruments | telephone ring tones | Phonokinesics: sounds of shoe tapping; water dripping |

**Figure 2. A beginning table of sound source for technical communicators**

| | Sound Source | | | | | |
|---|---|---|---|---|---|---|
| **Classification** | Human | | | Non-Human | | |
| **Linguistic Type** | Linguistic | Paralinguistic | Extralinguistic and silence | Linguistic | Paralinguistic | Extralinguistic and silence |
| **Auditory Type** | Speech Narration Song | Prosody including pitch, rate, loudness, etc. | Gasps, pauses, vocal noises, etc. | Computerized voice, tonal warnings, etc. | Prosody including pitch, rate, loudness, etc. | Musical Instrument, Digital Sound, Background Music, Animal Sounds, etc. |
| **Pisteis** | Logos, Pathos, Ethos | | | | | |
| **Rhetorical type or branch** | Deliberative, Forensic, Epideictic | | | | | |
| **Topoi** | Commonplace or generative | | | | | |
| **Audience Type** | Consumer, corporate, educational, political etc. | | | | | |
| **Effect** | Linguistic + Auditory + Rhetorical elements + Audience = Effect | | | | | |

with sounds other than the human voice. Those qualities can, however, be used to describe the affective properties of sound, even when the sound is not that of a computerized voice. In the same way we conversationally manipulate phrasing, voice tone, and volume levels, sounds can be used to make auditory stimuli mean different things. For example, most readers are probably familiar with the "charge" call of the bugle, if only from old western movies. Although the notes in that call are the same notes used to play "taps" (the bugle only plays five different notes), the calls are dramatically different, because of the player's ability to shape pitch through the use of facial muscles and through the way those notes are delivered (pitch, tempo, etc.). Thus, while one song is associated with loss and sadness, the other is designed to stimulate troops and convey a sense of urgency, and there can be no mistaking the difference between the meanings of the two, even if one has never heard them before.

Many familiar sounds can be easily classified in the same way using the table above. An ambulance siren, for example, does not create a narrative argument but is a recognizable argument nonetheless. The siren makes a rational argument, an appeal to logos that persuades us to pull over and let the ambulance pass. There is someone seriously injured or ill in the ambulance and

that person must be transported to the hospital as quickly as possible. An ambulance siren can be classified as a commonplace—a ready-made argument. We are asked to empathize with the situation of the passenger. Hearing the siren, we may be further influenced by pathos related to our own fear of dying, etc. Also, the law requires it, and we know that without being told each time in words. Therefore, an ambulance siren also makes a character-based argument.

Of course, there are many possible derivative combinations based on the categories above, and any resultant categorization would still require at least some explanation. But classifications offer a means for analysis that is recognizable and proven. For example, the pharmaceutical advertisement mentioned previously for a depression medication might utilize several different combinations of audio for several different purposes. As such, application of this model might require segmenting the advertisement for analysis, much as storyboarders do when creating those advertisements. Such an analysis might separate the commercial into three sections: an introduction of crisis, a solution, and an aftermath. This is a common formula for pharmaceutical ads, but they often incorporate multiple sound types to create multiple appeals or arguments. As such, analysis of the "crisis" phase might take the following form (Figure 3).

**Figure 3. Sample section analysis of the "crisis" phase**

| | Sound Source | | | | | |
|---|---|---|---|---|---|---|
| **Classification** | Human | | | Non-Human | | |
| **Linguistic Type** | Linguistic | Paralinguistic | Extralinguistic and silence | Linguistic | Paralinguistic | Extralinguistic and silence |
| **Auditory Type** | Narration | Descending pitch, slowed speech, quiet tones. | Silence to create emphasis | | Slow tempo, sad tones | Background Music, pauses for emphasis |
| **Pisteis** | Affective (pathos) | | | | | |
| **Rhetorical type or branch** | Deliberative | | | | | |
| **Topoi** | Commonplace acknowledgement of common symptoms | | | | | |
| **Audience Type** | Consumer | | | | | |
| **Effect** | Designed to instill a mood of sadness, despair, and a feeling of mounting crisis. Somber music paired with moving narration. Deliberative in that it sets the stage for supplying an answer to the crisis and supplies motivation for action through empathy. Establishes commonplace knowledge of depression effects with depression sufferers. | | | | | |

# Toward a Rhetoric of Sound

Consider the crisis section of this Cymbalta advertisement for comparison: https://www.youtube.com/watch?v=InYASbxhQ3M.

The first section of the advertisement may be said to present an argument based on sadness and/or fear by using linguistic, paralinguistic, and extralinguistic appeals via human voice narration, background music, and other sounds, each of which may be individually coded. By using a commonplace symptom description, for example, the ad's narration seeks to establish empathy with depression sufferers. This can be said to be "text" in that it emanates from a script, but the fact that it is recorded and delivered digitally makes it subject to both paralinguistic and extralinguistic influence. We might even question whether, due to the fact that it is recorded, the narration should be classified as human or non-human. At best, it is human once removed, because a digital recording is still a computer replication.

In contrast, the next section of an advertisement (usually offering a solution to the crisis) may play on different emotions such as hope through increased narrative rate, higher voice pitch, less somber music, and appeals to ethos, such as the ubiquitous commonplace, "My doctor said" or, "Ask your doctor" phrases often heard in pharmaceutical ads. Consider the example from a Symbicort commercial: https://www.youtube.com/watch?v=oG9MxLwnapE.

The analysis of this "solution" section would likely be quite different from the table above. In addition, this table would likely require further description of the advertisement itself, including the script and an analysis of visual elements for a complete picture of the rhetorical elements in play. It may also require an accompanying discussion of the intended audience. But, we already have tools for those facets of communication. What is lacking in technical communication is a sonic analysis tool. Hopefully, this table offers a starting point (albeit incomplete, no doubt) for further discussion about such a tool for technical communicators. If nothing else, it offers a first step in explaining those sounds systematically.

It would be interesting to see what other analyses might look like. Analysis of different audio types, such as ringtones or personal device alerts, for example, might look quite different, especially if they are customizable by users. Computers have now replaced many of the musical instruments of old, but the sounds that we depend upon for meaning remain (can you hear the sound of an incoming email as soon as I mention it?). In the future, interpersonal communication, medicine, financial transactions, and all sorts of everyday activities will depend even more on machines and sound to alert us to new information and to direct our activities. Personalization of those sounds will play a vital role in future technical communication.

## Designing Sounds

Because personal communication devices are so prolific, and because sound is such an integral part of those devices, designing sounds will also become an integral part of technical communication. Wearable technologies, for example, have only begun to tap their potential. While some ideas, such as Google Glass, have met with mixed reviews, technology companies are actively designing replacements for the cell phones we use today. Watches capable of controlling our communications are already popular, and we may expect to see ever less cumbersome and more capable devices in the near future.

We are moving into a time where technology allows for more than simple signaling—something beyond plain language while still incorporating plain language. But sound is underutilized, because we still think in terms of textual cues for digital communication. What is to prevent a smart washing machine, for example, from sending a simple sound (perhaps simply the sound of an active agitator) to a wearable device informing us that the wash cycle has completed? Or an integrated pharmacy from sending an auditory message informing us that a prescription has been filled? Or that our blood pressure is too high? Or that a child has left a defined perimeter? If horses were capable of learning bugle calls, surely, we are capable of reacting to auditory messages without textual cues.

These are the simple, signaling sounds referred to previously, of course. But what of a set of instructions? It seems perfectly logical for a set of auditory instructions to be delivered via wearable technology. But instructions may require warnings, for example, and would also depend upon paralinguistic cues to be maximally effective. As sounds continue to proliferate as a digital means of conveying technical information, we will be forced to design new sounds and to digitize existing sounds. Therein lies the additional value of this type of tool. Technical sound designers will need to be aware

of their impact, both practically and ethically, lest they design sounds that are misunderstood or manipulative.

More sounds are designed to convey specific messages every day. Personalized communication and technical information through sound will continue to proliferate in the future. Healthcare, especially personal health monitoring, is one avenue that is certain to grow rapidly, as is smart home technology. With that growth will come the opportunity for technology users and designers to personalize the sounds that alert them to new information.

The digital change that we have seen since the 1960's and 1970's is this: technical communication has transformed from being figuratively like a bugle call to being a bugle call, including the sonic qualities that come with audio messages. This type of communication has only marginally been viewed as a proper concern of technical communicators but should be incorporated into our discipline. Our field requires systematic studies of such sounds that will lead to a paradigm that can be used to properly transmit technical information through sound.

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# Communication Strategies for Diagnosing Technical Problems at a Help Desk

By Vincent D. Robles

**Abstract**

**Purpose:** This study intended to help technical support providers understand different communication strategies for diagnosing users' technical problems and how users may communicate those problems. Also, the study intended to help future researchers to better understand users' experience in seeking technical help.

**Method:** To contribute to this research area, I examined 18 help desk visits between 11 users and 6 technical support providers in an in-person help desk at a four-year university in the Midwest United States. I analyzed the communication for stages of the conversation in which the component devoted to diagnosing technical problems existed, closely analyzed the dialogue of both speakers during this stage, and explored associations between the communication strategies they used and the user satisfaction based on a customer-support satisfaction survey.

**Results:** The statistical tests suggested that more dialogue about the users' technical problem seems to associate with user satisfaction. The tests did not reveal a strong association between specific communication strategies and user satisfaction. The analysis of the visits showed how users shared their experiences through narratives and minimal responses, and how technical support providers used inquiries to understand user needs and experiences, providing a framework for understanding what the strategies look like.

**Conclusions:** This research provides a reliable way of identifying and categorizing the ways two speakers communicate to diagnose a technical problem, which provides a framework for new technical support providers to communicate during this part of the discussion.

**Keywords:** technical support, help communication, problem diagnosing, one-to-one conversations

**Practitioner's Takeaways:**

- Phrase inquiries according to specific user information: to understand users' needs, to understand users' experiences, to understand users' previous actions, and to understand where users experienced problems.
- Listen for associated answers to types of inquiries, despite users' propensities to give various types of information in response to these inquiries.
- Use open-ended questions to avoid miscommunication and to avoid using time to repair misunderstanding.
- Promote more discussion, especially from users, when diagnosing a technical problem, which appears to strongly associate with user satisfaction.
- Conduct small-scale analyses of technical support conversations using similar research procedures to understand how well technical support providers are communicating with your users.

# Communication Strategies for Diagnosing Technical Problems

## Introduction

Users commonly need help with a technology, and technical communicators use written and visual communication to mitigate the strains this need places on users. To better understand and improve this communication, technical communication researchers usually explore relatively asynchronous types of technical communication (e.g., documentation, forums, wikis), but because technical support providers (sometimes called customer support providers) communicate similar technical information in one-to-one synchronous interactions, technical communicators should find interest in learning how this communication works. This study explores such interactions.

During these interactions, technical support providers communicate with users to understand and resolve users' problems (Clark, Murfett, Rogers, & Ang, 2012; Xu, Wang, Forey, & Li, 2010). The existing research on these visits outlines the benefits they give to both users and organizations, but current research has not fully explored what the communication looks like in these visits. In identifying this lack of research, Lam and Hannah (2016), who explored technical support on Twitter, argued that "the relative lack of recent, specific technical communication scholarship about help desk interactions" should prompt technical communication researchers to "consider more fully how technical communicators can and ought to design for and deliver customer service as part of the technical support work they do" (p. 39). A study on technical support interactions contributes to our understanding of how users receive the help that technical support providers give.

As customers, users value person-to-person help desks because the information they receive addresses their specific goals and concerns (Steehouder, 2003; van Velsen, Steehouder, & de Jong, 2007). Person-to-person help desks provide "the total user support package" because they complement existing technical communication infrastructure such as documentation or support forums (van Velsen, Steehouder, & de Jong, 2007, p. 228). Also, users value help desks because they assume that technical support providers will resolve their technical problems quickly and that technical support providers will express concern and investment for the specific problems the users face (Callaghan &

Thompson, 2002). Documentation may not fulfill these expectations for quick and empathetic help, especially when users may feel it easier and quicker to ask for help rather than to read documentation.

Because such communication helps users and their individual needs, it maintains user loyalty and technology acceptance. This user loyalty and acceptance brings value to organizations. When organizations provide technical support for the technologies they produce for customers or for the technologies they require their employees to use, organizations maintain trust with these customers or employees, and they also enable these users to develop more confidence and trust in the technologies themselves (Bell, Hall, & Smalley, 2005; Hall, Verghis, Stockton, & Goh, 2014; Lee, Hsieh, & Ma, 2011; Nguyen, Groth, Walsh, & Henneg-Thurau, 2014). Thus, promoting user satisfaction with these visits not only serves the goals and concerns of users but also the goals and concerns of organizations.

Other fields such as organizational behavior (Barely, 1996; Das, 2002; Pentland, 2002), management studies and management information science (Armestad, Keily, Hole, & Prescott, 2002; Burgers, de Ruyter, Keen, & Streukens, 2000; Callaghan & Thompson, 2002), and marketing (Bell, Auh, & Smiley, 2005; Hall, Verghis, Stockton, & Goh, 2014; Nguyen, Groth, Walsh, & Henneg-Thurau, 2014) have explored the important role these conversations have within businesses, but they do not analyze the conversation itself, despite agreeing that service quality links to many business metrics such as customer loyalty, word-of-mouth referral, price insensitivity, sales growth, and market share (Bell, Auh, & Smalley, 2005, p. 169). Research on the communication between users and technical support providers can give technical support providers different strategies for communicating with users and provide for them insight in what they can expect when users communicate about their technical problems.

This article describes the communication of technical support providers in 18 face-to-face technical support visits at a help desk. Many descriptive studies of conversations have contributed to research using smaller sample studies of this type, especially when the goal was to provide a framework for understanding features of those conversations and for setting up hypotheses for future research (Beldad & Steehouder, 2015; Walker & Elias, 1987; Mackiewicz & Thompson, 2014; 2015).

These smaller sample studies mirror workplace research in which small samples can help practitioners to improve internal practices without the time consuming and, at times, costly requirements of larger studies. As organizations turn to text analysis to understand their customers, a study like this one can model text analysis research that organizations can adapt for their own contexts.

In this article, I focus on the communication technical support providers used for diagnosing problems because this stage is part of the two-part process of technical support (first diagnosis and then resolution). I sought to answer three research questions. I could answer the first two questions using a qualitative discourse analysis: (1) In help desk visits, how do technical support providers communicate to diagnose problems? (2) In help desk visits, how do users communicate to diagnose problems? Also, to explore further these conversations and to help develop hypotheses for future research, I explored the answer to a final research question with a Chi-square test for independence: (3) What communication strategies for diagnosing technical problems are associated with user satisfaction?

## Literature Review

While technical and customer support research shows that quality customer service does depend on technical support providers' meeting efficiency metrics (Armestead, Keily, Hole, & Prescott 2002; Burgers, de Ruyter, Keen, & Streukens, 2000), this study focuses on the "interpersonal performance" described by Armistead et al. (2002), specifically, the communication.

Meta-analyses of hiring surveys used by human resources to determine quality candidates found that technical or customer support providers must have personality characteristics coherent with a service orientation (Bettancourt & Brown, 1997; Burgers, de Ruyter, Keen, & Streukens, 2000; Frei & McDaniel, 1998; Mount, Barrick, & Stewart, 1998). However, the research in management, customer service, and marketing does not provide specific ways that newly hired workers can deliver that service through their communication.

Technical communication research has done considerable work to explore these conversations. First, studies have been quite unified in understanding how

the conversations are structured. Baker, Emmison, and Firth (2005) identified seven main phases of technical support conversations: Opening, Problem Analysis, Diagnosis, Solution, Instruction, Evaluation, and Closing. Steehouder and Hartman (2003) and Steehouder (2007) used this phase structure in their analyses of technical support transcripts. Clark, Murfett, Rogers, and Ang (2012) identified six "phases": Greeting, Identifying, Defining, Negotiating, Resolving, and Closing (p. 128). Similarly, Xu, Wang, Forey, and Li (2010) found five "moves:" Greeting, Purpose, Information, Service, and Farewell (p. 458–459). Underlying these structures is what Agar (1985) calls *institutional discourse*, which he theorizes is composed of three main stages: Diagnosis, Directives, and Reporting.

Ultimately, these studies agree that the conversations involve an opening component and a closing component. Within these two bookends, they agree that the conversation is devoted first to diagnosing the problem and then devoted to resolving the problem. This well-established structure provides researchers and practitioners a global understanding of the conversations. Research on the phrases and sentences within these larger components, however, could provide a fuller grasp of the conversations, yet few studies have done this examination.

The research that looked more closely at the conversation in this way uses some variation of conversation analysis, which focuses on speaker-to-speaker turn-taking, to explore the way the turn-taking reveals features of the conversation, such as how technical competence is expressed (Baker, Emmison, & Firth, 2005) or what moments of miscommunication look like (Beldad & Steehouder, 2015; Kelly, 2014). This approach lends helpful insight into the nature of these conversations or specific exchange moments of the conversation, but it does not discuss the way individual speakers use language to accomplish goals or intentions. In other words, this approach does not show speakers' strategies.

Two studies, however, focus on communication strategies. Clark, Murfett, Rogers, and Ang (2012) described empathetic communication strategies in customer support calls, and, for each communication strategy, they also described what they called "inhibitors," which worked against the intentions of the empathetic communication strategy. Their study provides a rich groundwork on which to build future

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study strategies associated with satisfactory support conversations. While empathy is a key personality marker of successful support providers (Bordoloi, 2004; Burgers, Ruyter, Keen, & Streukens, 2000; D'Cruz & Noronha, 2008; Dorman & Zijlstra, 2003; Pontes & Kelly, 2000), successful support providers should also be efficacious (execute the work process) (Bearden, Malhotra, & Uscategui, 1998).

Steehouder (2007) provides such a focus on the way the speakers communicate to execute the work process. He provides an important, and thus far the single, examination of communication when two people work together in "formulating the problem" (p. 2). For the technical support providers, he found the following strategies (pp. 3, 7): acknowledgments about the users' speculations, pauses to prime users to elaborate, inquiries, and simulations. For users, he found the following strategies (p. 2): assertions about the urgency of the problem, expressions about their lack of expertise, reports about previous attempts to solve the problem, descriptions of events or technology, and speculations about the cause of the problem.

Steehouder (2007) notes many users employ "historical reports" of the events that occurred using past tense verbs (p. 3). He also noted that some users with low technical expertise may be unsure "what might be relevant and what is not" for explaining their problem (p. 7). Steehouder's paper provides an excellent framework. He notes, however, that research could explore in more detail such strategies (p. 8). Specifically, the close analysis Steehouder presented from an example transcript does not account for how the analysis was conducted or how it might apply to other visits beyond the one presented. This article builds on Steehouder's research by demonstrating how to identify the strategies within the conversations, which can help practitioners to understand the technical support communication within their own organizations. Also, this study identifies more examples and categories of strategies, which gives technical support providers a range of strategies for communicating with users. Also, it gives future researchers hypotheses for large-scale research projects on this topic. Lastly, this study explores the relationship between strategies of the conversation and user satisfaction, a variable that Steehouder's (2007) work did not explore but which could engage practitioners interested not only in

keeping these conversations efficient but also in keeping them effective and satisfying to the users seeking help.

## Methods

The following sections outline details about the research site and participants, the data collection, and the data reduction and analysis.

### Research Site and Participants

The setting for this study was the technical support team for an English department at a large, Midwestern university in the United States. I discuss later how this university setting still provides implications for industry practices. The support team's supervisor, affiliated with the larger university online learning initiatives, agreed to the study, and, after receiving approval for this study from the Institutional Review Board (IRB) at the university, I recruited technical support providers and users. The IRB stipulated that I not reveal identifying characteristics, such as the name of the university and, especially, the names of participants. In total, this study explored the communication from six providers. These providers were graduate students from various disciplines—English, Technical and Professional Communication, and Linguistics—who demonstrated a proficiency in the technologies they supported, who demonstrated a proficiency for explaining the technologies to others, and who were hired by the support team supervisor. Users of these technical systems were English course instructors. Enrollment in the study entailed participants' assent to the data collection procedures described later in this section.

The department used an open source learning management system (Moodle) to administer course content for many of its courses. Users could visit the help desk for this system to address issues related to course and instructional design, and system features and procedures. The department also used an open-source electronic portfolio system (ePortfolio). The system allowed students to build online portfolios of their work. During the study, the department also developed a secondary use for the ePortfolio, called "eProfiles," which allowed instructors and students to create professional profile websites for professional development purposes. Because instructors had to help students use these systems, instructors could

seek help in effectively employing it in their courses or for their own professional development. Lastly, the department administered a teaching activities repository to which instructors could submit and retrieve teaching activities. Users could seek help in either retrieving or submitting activities.

Although 40 users enrolled, only 11 visited the support office throughout the seven-month data collection process, and two of them visited more than once. I told users that they could use their own or the support team computers to facilitate their support sessions and that they should only visit the support office for genuine technical problems they faced. Because these problems had to be genuine, they occurred incidentally and intermittently. Given time constraints, the data collection process had to end, though the data sample does mirror those of similar qualitative studies, as I discuss later.

## Data Collection Procedures

Once they had confirmed that visiting users were part of the study, the technical support providers began recording the conversation. Audio recording captured the conversation for the analysis, while the screen recording and facial recordings captured what Brown and Yule (1983) call "paralinguistic cues" (p. 4), which can be used by speakers to reinforce the meaning of their communication. Paralinguistic cues, such as leaning forward, laughing, smiling, breathing, screen activity, and others provided cues for interpreting the speakers' meaning. After beginning the recording, the technical support visits continued as they usually would without a study going on. Organizations could feasibly replicate these procedures were they to want to examine their technical support visits or if they wanted to provide models of particularly effective visits, which they could use to train new practitioners. Further, they could use these recordings for performance evaluations.

After the session was over, the users and the technical support providers each completed a post-session satisfaction survey designed for each of their roles that was based on a customer-service survey designed by Burgers, de Ruyter, Keen, and Streukens (2000) (see Appendix A for this survey). For this analysis, only the users' scores are reported and discussed, since their perceptions of the service, rather than the providers', serve as the most realistic business

case for gauging for how well a technical support visit went. Organizations could use their own surveys or the one offered in this study. Taken together with the recordings, organizations could examine highly rated visits using the analysis procedures I outline later.

I later interviewed technical support providers by walking each of them through selected excerpts from two visits they facilitated, except for one provider who only had one visit in the entire study. I played back the video and audio recordings of these moments for the providers and asked them what they were trying to accomplish with their communication. Their answers helped me to interpret the data and lent credibility to my interpretations. Organizations need not follow this procedure for their own research, but they could do so if they wanted to gain more insight into the practices of their own providers by asking them to consider specific visits with users.

As mentioned, data were collected for seven months and reached 20 visits total, given the time constraints associated with awaiting enrolled users to visit the help desk. This number provides enough data to develop a way to classify the language and follows similar sample sizes of other qualitative studies of this nature. For example, Beldad and Steehouder (2015) analyzed 25 technical support calls, Elias and Walker (1987) analyzed 10 tutoring visits, and Mackiwiecz and Thompson (2014; 2015) also analyzed 10 tutoring visits. Only when the research moved beyond the qualitative phase to a more quantitative focus did the sample size grow. For example, Mackiewicz (2017) built on her study of 10 visits by examining 47 visits for a larger scale corpus analysis. Indeed, Charney (1996) argued that while results from qualitative studies with small sample sizes and local contexts, such as this study, should not be touted as definitive results on a given research area, they are still the beginning of a research trajectory from which hypotheses can be developed (p. 591), which are what I contribute in the conclusion to this article. Organizations could easily (and more quickly) collect a sample like this one to gain insight about their own visits, especially if these samples are collected based on the user satisfaction scores. Echoing Nielsen and Landauer's (1993) well-known argument, later popularized on Nielsen's blog (2000), organizations could quickly gain the insight they need with smaller samples.

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### Data Reduction

Two undergraduate students and I transcribed the visits. For each visit, I checked the transcription three times before data coding, lending integrity to the data. Organizations could feasibly use transcription services for the visits they are interested in exploring, provided they give the appropriate legal considerations. Or they could skip transcription because they could simply consider the recordings themselves and take notes about moments within the recording.

I divided the transcript from each visit to mark the beginning and ends points of where I saw changes in the topic episodes. As Mackiewicz and Thompson (2015) state, topic episodes are identified by "monologic or dialogic strings of conversation that coherently address one subject" (p. 16). I found strings of the conversation that cohered around one subject and also looked for language markers that signaled a change ("Now" and "I also had another question"). At the phrase level, I segmented the speakers' speech by dividing it whenever the purpose of the speech changed, which is a conventional approach to dividing streams of language so they can be analyzed (Geisler, 2018; Rourke, Anderson, Garrison, & Archer, 2000). Organizations could feasibly find these episodes were they to consider such transitional moments.

### Data Coding Scheme

I employed a discourse analysis of the visits between these users and technical support providers. Discourse analysis studies the language in use when participants accomplish communication goals (Paltridge, 2012, p. 1). Specifically, I analyzed communication that signaled actions that participants accomplished with their speech, called Speech Acts (Brown and Yule, 1983; Searle, 1976).

To partition conversations into stages, I developed a coding scheme based on the studies outlined previously in the literature review. Specifically, I used my synthesis of the different coding schemes to create four larger categories that captured what each of the previous researchers had found: Specifically, these stages were Identifying, Defining, Resolving, and Closing. During the code development process, an independent coder and I determined one additional code would better describe the data. We found that a code about attempts to solve the problem could describe stages of the visit when the problem was not successfully resolved and either the visit had to continue another time or the problem was seemingly unresolvable. An independent coder and I coded the visit for 10% of the data, and, after three rounds of improving the codes, we arrived at acceptable reliability measures between us using Cohen's Kappa ($k$=.90). Table 1 describes the coding scheme for

**Table 1. Stages coding scheme**

| Stage | Definition |
|---|---|
| Identifying | Identifying the user as part of the technical system such as Moodle, including obtaining the user's name and any other pertinent identifying information about the user, such as course section. |
| Defining | Outlining, summarizing, and/or indicating that there is a problem or question. Often prompted by the user but could also be prompted by the technical support provider. |
| Attempting | Working through possible solutions to the problem or possible answers to the question. The problem does not get resolved fully or the question answered fully in that session. The technical support provider or user may not be satisfied with a proposed resolution or answer, or the user and/or technical support provider move on to a new problem without a resolution or answer. |
| Resolving | Providing information, instruction, and/or solutions for a problem and confirming a specific problem is resolved. The technical support provider and user are satisfied with the resolutions or answers. The problem has to be resolved or the question answered in that session. Making plans to solve the problem at another time (e.g., following-up through e-mail or another meeting, or trying something later at home) does not mean the problem or question was resolved or answered. |
| Closing | Confirming that the user is satisfied and the user has no more problems to talk about. Also saying good bye and/or setting-up a follow-up meeting or email conversation; includes taking the post-session survey if recorded |

stages. Organizations could feasibly employ this coding scheme to partition visits they want to examine.

For developing a scheme for categorizing communication strategies, code development was more challenging because no systematic coding scheme existed for analyzing these visit, though the results from Steehouder's (2007) study provided a beginning point. Using coding schemes developed for one-to-one tutoring visits (Mackiewicz & Thompson, 2015), I helped develop the codes so that they were more relevant to a technical support visit. An independent coder and I coded 10% of the data, and, after several rounds of improving the codes, we arrived at acceptable reliability measures using Cohen's Kappa (*k*=.79). I

then coded the remainder of the data set using the reliable coding schemes, which organizations can use or modify for their own visits. Further, while this code development process was time consuming and necessary for academic research of this type that uses discourse analysis (Giesler, 2018), organizations need not spend as much effort on reaching reliability measurements because they can consider (and modify) the coding scheme in Table 2 for their own workplace sites.

## Instrumentation

To determine a satisfactory or unsatisfactory outcome from a visit, I used a post-session survey (Appendix A). I designed one post-session survey for users based

**Table 2. Communication strategy coding scheme**

| Communication Strategy | Description for Technical Support Provider and User |
|---|---|
| Inquiring to understand needs or background information | Inquiring to understand or confirm listener's needs or background information |
| Inquiring to learn about the technology | Inquiring to learn about the technology, its settings or features, and/or how to use them |
| Inquiring to check comprehension | Inquiring to check if listener comprehends what speaker said, did, or saw/sees |
| Inquiring to gain permission | Inquiring to gain permission to do something at that moment during the conversation |
| Stating needs | Stating needs for the technology's settings/features or for the session's procedures |
| Giving background information | Giving background information about the problem or question |
| Confirming or denying | Confirming or denying what listener or speaker said, did, or asked with a yes- or no-type answer, an I-don't-know-type answer, or a noncommittal answer |
| Declaring the problem or problems as solved | Declaring a problem as solved or a question answered |
| Judging the technology | Judging the technology and/or its features through criticism or frustration |
| Observing | Describing what speaker sees, hears, or notices while using or observing the technology at that moment during the session |
| Speculating | Speculating about a problem or question |
| Signaling | Signaling what speaker is doing at that moment or what speaker will do next |
| Planning | Planning what to do either within or after the session |
| Showing how the technology works or how to do something with it | Showing listener how the technology works or how to do something with it by using the technology itself |
| Explaining how the technology works or how to do something with it | Explaining to listener how the technology works or how to do something with it without using the technology itself |
| Telling | Telling listener what to do at that moment in the session |

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on Burgers, de Ruyter, Keen, and Streukens' (2000) instrument, which was developed and validated to determine customer's expectations for support conversations. Two other researchers reviewed the survey, providing feedback on it for clarity and ease of use. This process checked face validity, which is the informed examination of an instrument to determine if the instrument appears to measure what the researcher intends (Wrench, Thomas-Maddox, Richmond, & McCrosky, 2013, p. 234). I could not adapt the wording of the instrument much further than replacing key words (such as "technical support provider" instead of "call center representative") to avoid tampering with an instrument that was already validated. Also, because this analysis focused on the process of diagnosing the technical problem, I concentrated on three items from this survey to determine satisfactory conversations. These three constructs all related to the process of diagnosing the problem: (1) the technical support person helped define specifically the problem(s); (2) the technical support person was able to imagine what I was going through with my problem(s); and (3) the technical support person treated my problem(s) as important.

To determine whether or not a visit was satisfactory, I recoded the six-point scale so that "Strongly Agree" counted as 6, "Agree" counted as 5, "Agree Somewhat" counted as 4, "Disagree Somewhat" counted as 3, "Disagree" counted as 2, and "Strongly Disagree" counted as 1.

I then summed the scores from each of the three items on the scale for each user participant in one visit and determined the mean for that participant (sum of scores/number of questions). The outcome for each visit was thus the mean for the users' responses for the 3 questions. Taking the average for each user participant across the 20 visits, I compared the average for one visit to the average for all visits. For example, I compared U11's average for all the questions in visit 1 to the average user response for all the visits. The average for the users for all 20 visits was 5.77 (SD=0.44). Therefore, U11's average for visit 1 was just below average (M=5.67, SD=0.38).

However, all participants tended to evaluate their experience highly, probably because they were trying to be polite to the technical support providers they may have known (though they submitted their responses to a private ballot box for which only I had the key).

To control for the smaller range between satisfactory scores (5.33–6.00), I categorized visits within one-half standard deviation of the mean. Specifically, 5.77 was the mean for all conversations and 0.44 was the SD; thus, one-half standard deviation was 0.22 (0.44/2=0.22). Therefore, above average conversations rated 5.99 or higher (5.77+0.22=5.99). Below average conversations rated 5.55 or lower (5.77-0.22=5.55). These measurements ensured that only cases on the ends of the scale contributed to the analysis. Table 3 describes the cases and what category (above average, average, and below average) described them.

**Table 3. Average, above average, and below average technical support conversations**

| Conversation | User | Technical Support Provider | Length | Mean Score | Group |
|---|---|---|---|---|---|
| 1 | U11 | TS2 | 6.11 | 5.67 | Average |
| 2 | U11 | TS2 | 10:16 | 6.00 | Above Average |
| 3 | U2 | TS4 | 1:56 | 6.00 | Above Average |
| 4 | U20 | TS4 | 31:02 | 6.00 | Above Average |
| 5 | U14 | TS2 | 8:55 | 5.33 | Below Average |
| 6 | U2 | TS7 | 11:47 | 5.33 | Below Average |
| 7 | U19 | TS7 | 7:33 | 6.00 | Above Average |
| 8 | U2 | TS7 | 8:58 | 5.33 | Below Average |
| 9 | U2 | TS8 | 6:27 | 6.00 | Above Average |
| 10 | U23 | TS2 | 10:31 | 5.33 | Below Average |
| 11 | U2 | TS6 | 11:12 | 6.00 | Above Average |
| 12 | U5 | TS2 | 1:57 | 5.33 | Below Average |
| 13 | U40 | TS2 | 17:36 | 6.00 | Above Average |
| 14 | U2 | TS8 | 7:39 | 6.00 | Above Average |
| 15 | U2 | TS3 | 1:49 | 6.00 | Above Average |
| 16 | U40 | TS7 | 33:12 | 6.00 | Above Average |
| 17 | U35 | TS3 | 12:52 | 5.67 | Average |
| 18 | U32 | TS2 | 5:47 | 5.33 | Below Average |
| 19 | U41 | TS7 | 27:42 | 6.00 | Above Average |
| 20 | U40 | TS2 | 15:24 | 6.00 | Above Average |

Ultimately, the data had more above average than below average visits (12 and 6), with only two average visits. This partition of the above average and below average visits allowed me to compare the communication strategies for each speaker in

order to determine the strategies that appeared to be associated with more satisfactory visits. I only explored proportional frequencies to normalize the data and control for the length of the visits. Further, chi-square tests of independence allowed me to determine significant differences between both groups while accounting for length differences between cases (the visits) and different sample sizes (12 and 6).

## Results

As indicated, this article focuses only on the communication strategies found in the defining stage, which serves the global purpose of diagnosing the technical problems. For this analysis, I only report on results from the above average and below average visits, excluding average visits. I give the quantitative analysis before the qualitative analysis. This organizational approach follows the presentation of results that Elias and Walker (1987) employed in their similar qualitative study.

### Most Frequent Communication Strategies

Table 4 describes the raw frequencies of communication strategies in the 18 visits. The total number of segments devoted to the Defining Stage was 510 segments (of the 1795 segments in the 18 visits, which was 28% of the visits). The most frequent strategy from both speakers in the defining stage was "giving background information" (133 times), followed by "inquiring to understand needs or background information" (86 times) and "confirming or denying" (79 times).

To explore the way strategies' frequencies associated with each group (below average and above average), I conducted a chi-square test of independence for each of the strategies except for those that appeared fewer than 5 times (Bewick, Cheek, & Ball, 2004). This test revealed that no individual strategies associated with the above average group in a statistically significant way (see Table 5). However, the test revealed that more talk, overall, associated with the above average group in a statistically significant way (p=0.00). To test the strength of this association, I conducted a Phil and Cramer's V test, and I found the results strong (V=0.424). I discuss a potential conclusion and implication of this result in a later section.

**Table 4. Frequencies for each communication strategy**

| Communication Strategy | Total |
|---|---|
| Giving Background Information | 133 |
| Inquiring to Understand Needs and Background Information | 86 |
| Confirming and Denying | 79 |
| Inquiring to Understand the Technology | 40 |
| Telling | 37 |
| Signaling | 36 |
| Stating Needs | 36 |
| Observing | 16 |
| Explaining How the Technology Works or How to Do Something with It | 12 |
| Inquiring to Check Comprehension | 9 |
| Speculating | 7 |
| Inquiring to Gain Permission | 7 |
| Judging the Technology' | 5 |
| Showing How the Technology Works or How to Do Something with It | 4 |
| Planning | 3 |
| **Total** | **510** |

## Communication Strategies Across and Within Subjects

To explore how speaker type associated with the strategies, I found the frequencies of each strategy for each speaker. First, I wanted to explore the frequencies across subjects (i.e., across columns). Table 6 shows that of the 133 times both speakers employed "giving background information," the users provided it 93.2% of the time. Table 6 also demonstrates that of the 86 times speakers employed "inquiring to understand needs or background information," the technical support providers provided it 89.5% of the time. Also, Table 6 demonstrates that of the 79 times speakers employed "confirming or denying," users provided it 63.3% of the time. Finally, of the 36 times "stating needs" appeared, users said it 97.2% of the time.

Analyzing the communication within subjects revealed further insight. Table 7 gives the same raw frequencies of each strategy, but it provides the percentage each speaker used each strategy of their own speech (within columns).

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**Table 5. Frequency, percentages, expected frequencies, and chi-square test results for communication strategies between above and below average groups**

| Communication Strategy | Above Avg. (%) | EF | Below Avg. (%) | EF | df | χ2 | P Value | Total |
|---|---|---|---|---|---|---|---|---|
| Giving Background Information | 92 (69.2) | 94.7 | 41 (30.8) | 38.3 | 1 | 0.352 | 0.553 | 133 |
| Inquiring to Understand Needs or Background Information | 66 (76.7) | 61.2 | 20 (23.3) | 24.8 | 1 | 1.563 | 0.211 | 86 |
| Confirming or Denying | 55 (69.6) | 56.2 | 24 (30.4) | 22.8 | 1 | 0.110 | 0.740 | 79 |
| Inquiring to Understand Technology | 30 (75.0) | 28.5 | 10 (25.0) | 11.5 | 1 | 0.309 | 0.578 | 40 |
| Telling | 22 (59.5) | 26.3 | 15 (40.5) | 10.7 | 1 | 2.670 | 0.102 | 37 |
| Signaling | 22 (61.1) | 25.6 | 14 (38.9) | 10.4 | 1 | 1.913 | 0.167 | 36 |
| Stating Needs | 29 (80.6) | 26.0 | 7 (19.4) | 10.0 | 1 | 1.358 | 0.244 | 36 |
| Observing | 8 (50.0) | - | 8 (50.0) | - | - | - | - | 16 |
| Explaining How the Technology Works or How to Do Something with It | 11 (91.7) | - | 1 (8.3) | - | - | - | - | 12 |
| Inquiring to Check Comprehension | 6 (66.7) | - | 3 (33.3) | - | - | - | - | 9 |
| Speculating | 6 (85.7) | - | 1 (14.3) | - | - | - | - | 7 |
| Inquiring to Gain Permission | 7 (100.0) | - | 0 (0.00) | - | - | - | - | 7 |
| Judging the Technology | 4 (80.0) | - | 1 (20.0) | - | - | - | - | 5 |
| Showing How the Technology Works or How to Do Something with It | 3 (75.0) | - | 1 (25.0) | - | - | - | - | 4 |
| Planning | 2 (66.7) | - | 1 (33.3) | - | - | - | - | 3 |
| **Total** | **363 (71.2)** | **255.0** | **147 (28.8)** | **255.0** | **1** | **182.965** | **0.000** | **510** |

**Table 6. Across-subjects analysis for each communication strategy and speaker**

| Communication Strategy | TS (%) | U (%) | Total |
|---|---|---|---|
| Giving Background Information | 9 (6.8) | 124 (93.2) | 133 |
| Inquiring to Understand Needs and Background Information | 77 (89.5) | 9 (10.5) | 86 |
| Confirming and Denying | 29 (36.7) | 50 (63.3) | 79 |
| Inquiring to Understand the Technology | 4 (10.0) | 36 (90.0) | 40 |
| Telling | 5 (13.5) | 32 (86.5) | 37 |
| Signaling | 29 (80.6) | 7 (19.4) | 36 |
| Stating Needs | 1 (2.8) | 35 (97.2) | 36 |
| Observing | 8 (50.0) | 8 (50.0) | 16 |
| Explaining How the Technology Works or How to Do Something with It | 9 (75.0) | 3 (25.0) | 12 |
| Inquiring to Check Comprehension | 2 (22.2) | 7 (78.8) | 9 |
| Speculating | 1 (14.3) | 6 (85.7) | 7 |
| Inquiring to Gain Permission | 1 (14.3) | 6 (85.7) | 7 |
| Judging the Technology' | 1 (20.00) | 4 (80.0) | 5 |
| Showing How the Technology Works or How to Do Something with It | 3 (33.3) | 1 (66.7) | 4 |
| Planning | 1 (33.3) | 2 (66.7) | 3 |
| **Total** | | | **510** |

Table 7 shows that technical support providers employed "inquiring to understand needs or background information" in 42.8% of all of their own speech. Also, users employed "giving background information" in 37.6% of their own speech. They only spent 10.9% of their time "inquiring to learn about the technology."

Thus, both analyses suggest that the primary role of technical support providers during this stage may be to ask questions while users' role may be to provide answers. Users gave more information than technical support providers, and technical support providers asked more questions than users, with the exception of "inquiring to understand the technology." That users rarely asked questions, particularly about the technology, seems to indicate that they were more interested in sharing experiences about their technical problems than they were in learning about the technology or how to do something with it. I discuss this result and implications from it in a later section.

To determine the role of each speaker type in facilitating above and below average visits, I conducted a chi-square test of independence between the above and below average groups for each speaker. However, no significant differences resulted. When noting the percentages in each group (see Table 8), I saw that the

percentages for each speaker for each strategy were relatively close. For example, users gave background information and technical support providers inquired about information at roughly the same percentage in both groups. The chi-square test results confirmed this assumption (not provided in Table 8). This result from this exploratory analysis indicated that no specific strategy associated with satisfactory outcomes, a finding I discuss in a later section.

## Example Communication Strategies

To better understand the communication strategies employed during the diagnosing process, the following results provide a qualitative picture of the exchanges between the two participants. I portray the exchanges that appeared most frequently, especially technical support provider (TS) inquiries and user (U) responses. This presentation describes how the technical support providers served as the listeners and the users served as the reporters.

### Technical support provider inquiries

The most common strategy for technical support providers was inquiring to understand needs or background information (77 times). Technical support providers inquired to gain background information to

**Table 7. Within-subjects analysis for each communication strategy and speaker**

| Communication Strategy | TS (%) | U (%) |
|---|---|---|
| Giving Background Information | 9 (5) | 124 (37.6) |
| Inquiring to Understand Needs and Background Information | 77 (42.8) | 9 (2.7) |
| Confirming and Denying | 29 (16.1) | 50 (15.2) |
| Inquiring to Understand the Technology | 4 (2.2) | 36 (10.9) |
| Telling | 5 (13.5) | 32 (9.75) |
| Signaling | 29 (16.1) | 7 (2.1) |
| Stating Needs | 1 (0.6) | 35 (10.6) |
| Observing | 8 (4.4) | 8 (2.4) |
| Explaining How the Technology Works or How to Do Something with It | 9 (5.0) | 3 (0.9) |
| Inquiring to Check Comprehension | 2 (1.1) | 7 (2.1) |
| Speculating | 1 (0.6) | 6 (1.8) |
| Inquiring to Gain Permission | 1 (0.6) | 6 (1.8) |
| Judging the Technology | 1 (0.6) | 4 (1.2) |
| Showing How the Technology Works or How to Do Something with It | 3 (1.7) | 1 (0.3) |
| Planning | 1 (0.6) | 2 (0.6) |
| **Total** | **180** | **330** |

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**Table 8. Comparison of above average and below average groups between speakers**

| Communication Strategy | Above Average | | | Below Average | | |
|---|---|---|---|---|---|---|
| | TS (%) | U (%) | Total | TS (%) | U (%) | Total |
| Giving Background Information | 6 (6.5) | 86 (93.5) | 92 | 3 (7.3) | 38 (92.7) | 41 |
| Inquiring to Understand Needs or Background Information | 57 (86.4) | 9 (13.6) | 66 | 20 (100.0) | 0 (0.0) | 20 |
| Confirming or Denying | 20 (36.4) | 35 (63.6) | 55 | 9 (37.5) | 15 (62.5) | 24 |
| Inquiring to Understand the Technology | 3 (10.0) | 27 (90.0) | 30 | 1 (10.0) | 9 (90.0) | 10 |
| Stating Needs | 1 (3.4) | 28 (96.6) | 29 | 0 (0.0) | 7 (100.0) | 7 |
| Signaling | 16 (72.7) | 6 (27.3) | 22 | 13 (92.9) | 1 (7.1) | 14 |
| Telling | 4 (18.2) | 18 (81.8) | 22 | 1 (6.7) | 14 (93.3) | 15 |
| Explaining How the Technology Works or How to Do Something | 8 (72.7) | 3 (27.3) | 11 | 1 (100.0) | 0 (0.0) | 1 |
| Observing | 4 (50.0) | 4 (50.0) | 8 | 4 (50.0) | 4 (50.0) | 8 |
| Inquiring to Gain Permission | 1 (14.3) | 6 (85.7) | 7 | 0 (0.0) | 0 (0.0) | 0 |
| Speculating | 1 (16.7) | 5 (83.3) | 6 | 0 (0.0) | 1 (100.0) | 1 |
| Inquiring to Check Comprehension | 1 (16.7) | 5 (83.3) | 6 | 1 (33.3) | 2 (66.7) | 3 |
| Judging the Technology | 1 (25.0) | 3 (75.0) | 4 | 0 (0.0) | 1 (100.0) | 1 |
| Showing How the Technology Works or How to Do Something | 3 (100.0) | 0 (0.0) | 3 | 0 (0.0) | 1 (100.0) | 1 |
| Planning | 0 (0.0) | 2 (100.0) | 2 | 1 (100.0) | 0 (0.00) | 1 |
| **Total** | **126 (34.7)** | **237 (65.3)** | **363** | **54 (36.7)** | **93 (63.3)** | **147** |

acquire contextual information about the users' needs to adequately define the problem. Implied in the name of the strategy is that speakers sought two types of information: needs or background information.

To gain the background information, they *inquired about where the problem might be located* so that they could have access to the problem. In one example, TS4 asked U20, "Could you let me know the [name of the] student who dropped your course?" TS4 did this while searching a roster of students, clearly looking to find that student so that she could suspend that student from the course website. In another instance, TS7 asked U2, "'Grades'?" while navigating to the place where U2 stated she was having a problem marking course attendance as extra credit. TS7 appeared to ask if that was the place where she should check.

Technical support providers also *inquired about users' experiences with the technology*. For example, TS4 asked U20 to confirm her experience with the textbox in the Moodle grading system: "So you said that this entire editor box gets bigger?" This information likely helped TS4 to ensure that she and U20 had similar frames of understanding about the user's experience.

Likewise, TS8 confirmed that U2's message never went to her students' email inboxes when she used the announcement module in Moodle: "It didn't go out at all? At all?" These kinds of inquiries helped the technical support providers to ensure that they understood the problems by giving the problems more definition and by providing users the opportunity to help define it further through their responses to the inquiries about experiences.

Technical support providers also *inquired about users' previous actions*. This information, TS2 told me, helped him to walk through potential causes of the problem, whether users or the system caused the problem. For example, TS2 asked U23 how she created a quiz that was not behaving the way she wanted: "And did you duplicate the quiz when you created the new one or did you just create a new one from scratch?" This inquiry seemed to help TS2 to determine if U23's previous actions caused the problem or not. In another case, TS4 wanted to ensure that a student had dropped a course before removing that student from the course website: "So they dropped your course- classes? They dropped it?" This information helped TS4, she told me,

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to ensure that she followed protocol when handling a common request from instructors (to remove students from the course website when they dropped the course).

As mentioned previously, the strategy of inquiring to understand needs or background information implies two types of information that technical support providers sought: background information and needs. Technical support providers *inquired about the specifications of users' needs*. In one example, TS2 helped U11 create a lesson module for U11's course website. As TS2 set it up for U11, TS2 inquired about the specifications U11 wanted for the lesson's behavior. For example, "So you want them to keep doing it until they get it right?" Here TS2 asked if U11 wanted her students to have the ability to retry tests until the students got the correct answers. Also, TS2 asked, "So you want it to display the question- again- but have it be check or-?" These examples demonstrate technical support providers' careful tendency to understand what users wanted the technology to look like or do for them.

In other cases, technical support providers *inquired to understand needs in general*. As may be expected, a conventional question was "what can I help with" or a variation on it such as, "So what is your question?"

## User Reports

The most frequent strategy that users employed was giving background information (124 times). I discuss two basic categories related to this strategy: (1) describing previous actions taken and (2) describing experience with the problem.

When *describing previous actions taken*, users often shared stories or narratives. For example, U32 began the defining stage with a long narrative about previous actions she and others had taken:

> U32: when I had, um, someone from [*team name*], it was [*TS8*]. He came to my classroom and showed my students how to set up their e-portfolios, and he used mine as an example. It was the one that I had set up during a training session for [*course name*] students. So I had like some of my own things, and then [*TS8*] was like "you don't want this visible to your students, you need to have your e-portfolio for [*course name*] separate from like whatever it was that I had it." And he said he could help me if I came here, which I then completely ignored until now because I've actually got an assignment due, of

course this week. So of course now I'm coming in to ask for help.

The information served to springboard the conversation into the defining stage. In other instances, users shared previous attempts they had taken in solving the problem. When trying to explain more about a problem with an assignment module's cut-off settings, U2 stated what actions she had taken to solve the problem:

> U2: So there, the "allow submission from" and "due date" and "cut-off date." So I just disabled those because they were causing problems.

She also accounted for her attempt in solving it, specifically, what buttons she was using ("due date" and "cut-off date"). These examples demonstrate how the users would describe the actions they took in relationship to the problem to give more context to the problem.

When *describing experiences with the problem,* for example, U20 shared her experience typing feedback to students:

> U20: I'll be typing and all of a sudden it will get bigger. And I don't know how to make it- like this part [*pointing to U20's personal computer*] this whole thing will get bigger-

U40 shared also her students' experiences, in this case, when they uploaded images to the ePortfolio system:

> U40: So, my students are creating a new page. And they want to add an image. The problem that we've had is that message "too large won't accept" comes up.

These descriptions of the problem provided appropriate information about the users' experiences with the technology. In some cases, they occurred when the problem was first introduced, or in other cases, they occurred as follow-up descriptions in response to questions from the technical support providers.

## User confirmations or denials

When asked about needs or background information, users also responded minimally with short confirmation

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or denials (yes-no responses) to technical support providers. Users employed minimal responses (1) to inquiries about specific needs, (2) to previous actions, (3) to experiences with the problem, and (4) to the location of the problem.

First, users gave *minimal responses to inquiries about specific needs*. For example, TS7 opened the defining stage, presumably right after the recording began with an inquiry about a specific need:

> TS7:O.K., so you want to look at the gradebook [*1 second*] and if we can make something extra credit, right?
>
> U20:**Yep.**

In other exchanges, users gave *minimal responses to inquiries about previous actions*. In many of these instances, the assumption underlying the inquiry was about an action that the users may have done in setting up their courses. For example, U2 wanted to make an assignment to be extra credit like another assignment she already put together. To this, TS4 asked:

> TS2:Oh, this is extra credit?
>
> U2:**Yeah.**

In this exchange, TS2 inquired about an action that U2 had completed (making the other assignment extra credit). The underlying assumption behind the question appears to be, "You made this extra credit?" positioning the question as an inquiry about previous actions.

In other instances, users provided *minimal responses to inquiries about experiences with the problem*. For example, TS2 wanted to confirm what U14 shared about students' not seeing an assignment on the course website:

> TS2:They're not showing up clearly?
>
> U14:**Yeah.**

Based on these examples, it seems that minimal responses from users appeared after technical support providers inquired to confirm something that the users already shared about their experiences. Indeed,

to phrase these inquiries, technical support providers needed prior knowledge about that experience to make the question close-ended and thus amenable to a yes-no response, a result I discuss in the next section.

Lastly, users employed *minimal responses to inquiries to understand where the problem was located*. For example, U2 wanted to designate one assignment extra credit the way she had done with another assignment. TS4 wanted to confirm which assignment U2 wanted to make extra credit:

> TS4:This one for participation?
>
> U2:**Yeah.**

Similarly, when helping U20 to remove a student from her course website, TS4 scrolled through the roster to find the student that U20 wanted to remove. After U20 gave the name, TS4 asked:

> TS4:This one?
>
> U20:**Mm-hmm.**

Ultimately, these examples demonstrate how users employed these minimal responses to inform technical support providers when users were asked follow-up questions.

### User elaborations

To better understand the nature of users' responses to technical support providers' inquiries, I found connections between users' response types. One such connection was "confirming or denying" followed by "giving background information" when the users provided the response, suggesting that users giving the minimal response was not always the final moment in a given exchange.

When users expanded on their own confirmations or denials, they went beyond the closed-ended inquiry posed to them. For example, TS7 posed a close-ended question seeking background information to which U41 responded with the appropriate close-ended response. U41 then expanded on that response:

> TS7:Uh, we're working on your portfolio? Is that right?

U41:**Yeah.** Because I got an email- that said that my student profile is ready to be set up.

TS8 and U23 shared a similar exchange, as U23 described her problem with a duplicated quiz:

TS8:So, all the questions in here?

U23:**Yeah**, so these are questions from the next topic.

TS8:O.K.

U23:All I did was create the new quiz.

These exchange patterns indicate how users first confirmed or denied technical support providers' inquiries about background information, but they often moved beyond their initial responses to provide additional information, a finding I discuss in the next section.

## Discussion

The results confirm current research and anecdotal intuition on technical support conversations about the strategies in technical support diagnosing processes, but these results are specific and systematic. It shows how technical support providers assumed a role as listeners and users assumed a role as reporters, findings that can be explored further.

When comparing the frequencies of the strategies between the above and below average groups, I found no significant difference between them when analyzing strategies individually. However, I found that a larger number of strategies resulted in a strong association with the above average group. Given that previous research, especially in management, found that the quality of communication deserves exploration, this finding signals that quantity of communication, especially the strategic communication explored in this study, may also associate with satisfactory conversations. Perhaps users felt they were given the appropriate opportunity to express their experiences and did not feel rushed through the diagnosis component. Or perhaps they felt they understood more completely what the problem was because they had more time to consider it. This result

implies that both speakers' freedom, and especially the users' freedom, to communicate about the problem can possibly yield more satisfactory outcomes. Thus, two initial hypotheses for future research are the following:

**H1:** The quantity of strategic communication in a defining stage of a technical support conversation can affect higher user satisfaction.

**H2:** The quantity of strategic communication users contribute to a defining stage of a technical support conversation can affect higher user satisfaction.

Second, the within- and across-subjects analyses indicated how technical support providers inquired more than users did and how users gave information more than technical support providers did. These results illustrate Agar's (1985) theory that the process of diagnosing the problem involves the clients' and institutional representatives' aligning their understanding. This study thus provides a framework for classifying strategies that technical support providers can employ.

Furthermore, users communicated this contextual information, as Steehouder (2007) points out, through narratives or sequences of events, or what he calls "historical reports" (p. 3). This study illustrates how users share this information, and it provides a framework for considering users' communication as they respond to inquiries. Notably, it also finds that users did not make inquiries as much as they gave information. They appeared to focus on sharing their experiences. Perhaps users generally come to help with undesirable experiences they want resolved rather than with a desire to learn something new. Three hypotheses for future research may be the following:

**H3:** More instances of technical support provider inquiring of users in the defining stage can affect higher user satisfaction.

**H4:** More instances of users giving information in the defining stage can affect higher user satisfaction.

**H5:** Users more often seek help to resolve undesirable technical experiences than to learn something about the technology.

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Further, hypotheses related to each type of strategy in this study may be tested for their relationships to user satisfaction, especially in a larger data sample.

## Conclusion

This study provided insight about the communication strategies from each speaker in technical support conversations, but more data would reveal more about these conversations and yield more representative results to explain how the communication strategies promote satisfaction. Also, the coding scheme should be refined further and potentially split to form more precise codes. For example, inquiring to understand needs and background information implies a logical split between two sorts of inquiries that could be finessed into two reliable codes.

The study took place in a university setting, which likely influenced the findings. However, the results from this study provide implications for industry practices. Help desk visits in both higher education and industry settings require the same customer service quality features described by foundational customer service studies, such as those conducted by Parasurman, Zaithamal, and Berry (1988) and, more recently, Burgers, de Ruyter, Keen, and Streukens (2000). When help desks are not available (and perhaps only documentation is available), user satisfaction decreases. Islam (2014) found, for instance, that instructors in a university expressed dissatisfaction with an educational technology system when they felt a lack of such technical support that would otherwise help them to do their jobs (p. 255). Nawaz and Kahn (2012) stated that investing in a help facility strengthens higher education goals because such investments serve and help the main users of the systems: teachers and students (p. 42). Therefore, administrators of businesses concerned for their employees and their needs would agree with university administrators that by devoting attention to the support that employees receive in using a key organizational technology, they can further the goals of their organizations. Thus, this study's findings, while certainly influenced by the research setting, provide reasonable applicability to other workplaces because the findings serve the business goal of providing useful help communication to key stakeholders (i.e., employees).

## Implications for Practice

The study has implications for technical support practice.

First, practitioners should phrase inquiries according to specific user information: (1) to understand users' needs, (2) to understand users' experiences, (3) to understand users' previous actions, and (4) to understand where the user experienced the problem. I presented examples of such inquiries, and practitioners could draw from the examples given in this study to formulate training materials with inquiry types that can yield the information they may need from users. The conscious effort to draw from categories of inquiries could facilitate more efficient results as well, especially when efficiency remains one of managerial studies' metrics for successful technical support conversations.

Second, practitioners should listen for associated answers to each type of inquiry, conscious of which type they employed themselves. Users seem prone to give various types of information types in response to these inquiries that may not match up with the inquiry presented to them. Practitioners should follow up accordingly to align users' reports, minimal responses, and elaborations with the information the practitioner requires to diagnose the problem. This careful communication may be all the more important in contexts in which the two speakers cannot see one another to respond to nonverbal cues, as in voice-to-voice technical support.

Third, practitioners should use open-ended questions to avoid miscommunication and to avoid using time to repair misunderstanding. In this study's excerpts, users elaborated on their initial minimal responses, but they may not always have done so, requiring the technical support provider to pause or seek additional information. Technical support providers run the risk of miscommunication if they continually use yes-or-no questions to understand users' experiences. Or, they must spend the time to repair this miscommunication by asking more follow-up questions. The need to follow up so frequently may present frustrations but perhaps also in spaces such as chat systems, which is also a contemporary mode for technical support. Thus, open-ended questioning could mitigate frustrations in these new media spaces.

Fourth, practitioners should consider examining the visits within their own organizations using similar procedures as those procedures outlined in this article. Although user satisfaction scores give insight about

more effective technical support providers, organizations would benefit by knowing what communication strategies can help technical support providers reach that outcome. For example, insight from a few highly rated visits compared to a few poorly rated visits could benefit the help desk center by showcasing the role communication played in a visit's successes.

Lastly, practitioners should promote more conversation overall and, especially, more user speech when diagnosing the technical problem because users may feel they are receiving the appropriate opportunity to describe their experiences. Further, practitioners may feel it necessary to ensure that users, not the practitioners only, understand the problem.

## Implications for Research

These inquiries and their corresponding responses have been systematically and reliably identified for other researchers to employ, should they wish in their own studies of communication in these conversations, and also to help develop and test hypotheses about the relationship between certain strategies and satisfactory outcomes.

For example, future research should build on this coding scheme, which has gone through reliability testing, for other contexts. A study of other technical support centers may reveal other strategies and, perhaps more importantly, a variety of satisfaction levels. Also, researchers might answer questions related to contexts such as how the strategies may differ in international contexts when technical support has been offshored.

Also, future research could explore and confirm the usefulness of this coding scheme for a technical support call center with voice-voice conversations. Also, though these findings can be applied to synchronous chat spaces: What differences might exist for the strategies in such electronic spaces? And though asynchronous support spaces such as Twitter and discussion forums have had some attention in technical communication research (Lam & Hannah, 2016; Swarts, 2014), future research could further explore the strategies in these venues or similar venues such as email communication.

Ultimately, this study provided a picture of what it looks like when technical support providers and users diagnose technical problems, providing insight for technical support practice and for understanding the needs and motivations of users when they seek technical help. Although the results presented here would seem intuitive, applied research helps confirm or challenge experiences that may be based merely on anecdote or culture. This study explored and presented these experiences systematically, and it invites new ways to explore them across contexts, an endeavor important in technical communication research, which aims to improve communication with users, customers, businesses, and employees.

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# Communication Strategies for Diagnosing Technical Problems

## Appendix A: Post Session Survey

### User Post-Session Survey

**Name:**_____

**Date:** _____

Please indicate how much you agree with the following statements about the support session you just had.

1. The technical support person answered different question(s) or complaint(s) I had with little difficulty.
   1. Strongly Agree
   2. Agree
   3. Agree Somewhat
   4. Disagree Somewhat
   5. Disagree
   6. Strongly Disagree

2. The technical support person adapted to every situation that occurred during the session.
   1. Strongly Agree
   2. Agree
   3. Agree Somewhat
   4. Disagree Somewhat
   5. Disagree
   6. Strongly Disagree

3. The technical support person took my knowledge into account when helping solve the problem(s).
   1. Strongly Agree
   2. Agree
   3. Agree Somewhat
   4. Disagree Somewhat
   5. Disagree
   6. Strongly Disagree

4. The technical support person remained calm and friendly no matter how I was feeling.
   1. Strongly Agree
   2. Agree
   3. Agree Somewhat
   4. Disagree Somewhat
   5. Disagree
   6. Strongly Disagree

5. The technical support person helped define specifically the problem(s).
   1. Strongly Agree
   2. Agree
   3. Agree Somewhat
   4. Disagree Somewhat
   5. Disagree
   6. Strongly Disagree

6. The technical support person was able to help with each and every problem in a timely way.
   1. Strongly Agree
   2. Agree
   3. Agree Somewhat
   4. Disagree Somewhat
   5. Disagree
   6. Strongly Disagree

7. The technical support person clearly and thoroughly explained each and every step he or she took when solving the problem(s).
   1. Strongly Agree
   2. Agree
   3. Agree Somewhat
   4. Disagree Somewhat
   5. Disagree
   6. Strongly Disagree

8. The technical support person clearly and thoroughly explained solutions or recommendations.
   1. Strongly Agree
   2. Agree
   3. Agree Somewhat
   4. Disagree Somewhat
   5. Disagree
   6. Strongly Disagree

9.  The technical support person was able to imagine what I was going through with my problem(s).
    1. Strongly Agree
    2. Agree
    3. Agree Somewhat
    4. Disagree Somewhat
    5. Disagree
    6. Strongly Disagree

10. The technical support person treated me uniquely from other users.
    1. Strongly Agree
    2. Agree
    3. Agree Somewhat
    4. Disagree Somewhat
    5. Disagree
    6. Strongly Disagree

11. The technical support person treated my problem(s) as important.
    1. Strongly Agree
    2. Agree
    3. Agree Somewhat
    4. Disagree Somewhat
    5. Disagree
    6. Strongly Disagree

12. The technical support person had the necessary authority to solve my problem (s).
    1. Strongly Agree
    2. Agree
    3. Agree Somewhat
    4. Disagree Somewhat
    5. Disagree
    6. Strongly Disagree

13. The technical support person will have to follow up with me to help me with the problem(s) because he or she needs to seek permission or help.
    1. Strongly Agree
    2. Agree
    3. Agree Somewhat
    4. Disagree Somewhat
    5. Disagree
    6. Strongly Disagree

# Effects of Visual Signaling in Screenshots: An Eye Tracking Study

By Michael Meng

**Abstract**

**Purpose**: Screenshots are an important means of visualization in software documentation. One question technical communicators need to address when dealing with screenshots is whether visual signaling elements, such as arrows or frames, should be added in order to highlight relevant information. This article reports the results of an experimental study that examined whether signaling elements successfully guide visual attention of readers to relevant screenshot information as intended. A second goal was to find out whether visual signaling has a positive impact on how accurate and fast users execute the tasks which the screenshots support.

**Method:** Two versions of a software tutorial were constructed that included screenshots with or without signaling elements. Participants' eye movements were recorded while they studied the tutorial and executed the tasks described therein. In addition to eye movement measures, accuracy of task execution and time to complete the tasks were determined as measures of overall success on the tasks.

**Results:** Participants working with tutorials that used visual signaling executed more tasks correctly. No differences were found regarding the time needed to complete the tasks. Analysis of the eye tracking data showed that participants fixated relevant screenshot areas longer and more often if highlighted by signaling elements.

**Conclusions:** The results provide evidence that adding signaling elements to screenshots is an effective means to guide the visual attention of users. As predicted by the Cognitive Theory of Multimedia Learning, visual signaling does not simply increase interest in pictures but helps users to select relevant information.

**Keywords:** screenshots, software tutorials, visual signaling, eye tracking

**Practitioner's Takeaway:**

- Research on factors that modulate the effects of screenshots on user performance can help technical communicators to make informed decisions regarding screenshot usage and design.
- The article provides empirical evidence that adding signaling elements to screenshots helps the user to select relevant information from screenshots and improves user performance.

- More research is needed to determine which signaling techniques are effective and whether effects of signaling interact with other factors such as task complexity and user experience. Collecting eye movements while users can freely switch their attention between reading and acting can help to address these questions.

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## Introduction

Planning and creating graphics that assist the user in executing a procedure correctly and efficiently is a routine task of technical communicators. In the area of software documentation, the type of graphic most commonly used for this purpose is screenshots. Screenshots provide an efficient means to visualize the state of the graphical user interface of a software system at a certain point, such as the initial state from which a procedure starts, the overall goal state, or intermediate states that result if the procedure is carried out successfully (Farkas, 1999; van der Meij & Gellevij, 2004).

When adding screenshots to software manuals, online help systems or tutorials, technical communicators have to address several important questions (van der Meij & Gellevij, 1998). A first set of decisions concerns when screenshots should be used and which function each individual screenshot should serve. For example, when developing a procedure consisting of several action steps, decisions have to be made whether none, some, or all action steps should be supported by a screenshot, and whether the individual screenshots should help the user to locate and identify user interface elements (e.g., by depicting a menu entry or to help the user to compare the current state of the user interface with the intended goal state, e.g., by depicting the screen that results from carrying out an action step).

Once the decision to use a screenshot at a certain point has been made, several additional decisions follow that relate to screenshot design (van der Meij, 2000), such as which portion of the user interface the screenshot should depict or where the screenshot should be positioned. This article focuses on the effects of a design decision that is particularly important: the decision of whether signaling elements should be added to a screenshot or not.

Signaling refers to a set of cueing techniques that have been discussed extensively both in the domain of text design and text comprehension (Lorch, 1989; Spyridakis, 1989) as well as in multimedia learning (Mautone & Mayer, 2001; Koning, Tabbers, Rikers, & Paas, 2009; Moreno, 2007; Richter, Scheiter, & Eitel, 2016). Common to all signaling techniques is that they are added to material in order to help the user know how to process the material (Mayer, 2009). Signaling elements do not add content. Their main function is to direct the attention of the user to content that is relevant in the context of a certain task or goal.

Two types of signaling have been distinguished in the literature: verbal signaling and visual signaling (Mayer, 2009). Verbal signaling includes cues that are added to a text, such as headings, highlighted words, or outlines presented before a text. Headings, highlighted words, and outlines help users to understand the organization of a text. They are added to direct the user's attention to particular terms, concepts, or propositions that the author regards important. In technical documentation, verbal signaling is also commonly used to indicate the function that a particular unit of text serves. For example, numbers or bullets may be used to identify a text unit as an action step, and check marks could be used to identify a text unit as a result statement.

Visual signaling, on the other hand, refers to cues that are added to pictures, such as frames, arrows, magnifiers, or distinctive colors. Frames, arrows, and similar signaling techniques are added to pictures to direct the visual attention of users to specific areas of the picture containing important information. The goal of the current study is to investigate the effect of visual signaling in screenshots contained in procedures on user behavior. More specifically, the study asks whether signaling indeed guides visual attention, and whether this "guiding effect" improves user performance.

Knowing whether and why users benefit from visual signaling in screenshots is not only of interest from a theoretical point of view but also if an applied perspective is taken (Martin-Michiellot & Mendelsohn, 2000). Adding frames, arrows, or similar cues to screenshots is associated with a specific cost, which reflects the effort it takes to implement the signaling elements. This cost increases considerably if not only the initial efforts in designing a screenshot are taken into account but also subsequent efforts related to documentation maintenance and localization. In order to decide whether these efforts are justified, technical communicators have to know whether visual signaling works as intended. The present study is intended to provide arguments on which such a decision can be based. It contributes the results of research that—in the sense of Boekelder and Steehouder (1999)—was designed to serve practice by studying the functional relation between a design aspect (visual signaling in

# Effects of Visual Signaling in Screenshots

screenshots) and reading behavior of documentation users. The study asks whether a specific design change (adding visual signaling) changes reading behavior in the intended way, which is that users pay more attention to relevant information on a screenshot and ignore irrelevant information. In addition, the study asks whether this change in reading behavior results in documentation that enables users to execute a procedure more effectively.

By focusing on user behavior, the type of research reported here is closely related to efforts to make documentation more usable, which is a fundamental concern of technical communicators (Guillemette, 1989; Redish, 2010; Alexander, 2013; Arachya, 2017). However, unlike standard usability testing, the aim is not to find out whether a particular information product is effective or not or where potential trouble spots are. Rather, the goal is to reveal more fundamental principles of communication whose consequences can be applied to information products containing screenshots in general.

## Prior Research on Screenshots

The question whether screenshots effectively support users of software documentation has been addressed in a series of studies by Hans van der Meij, Mark Gellevij, and colleagues conducted in the late 1990s and early 2000s (see Gellevij & van der Meij, 2004, and van der Meij, Karreman, & Steehouder, 2009, for overviews). One of the first experiments demonstrating that screenshots may positively affect task execution was reported in van der Meij (1996). The study tested users on two versions of a training manual for a database application. The study found that users of the manual version containing screenshots completed the training tasks significantly faster compared to the group working with a text-only control version. No effect of screenshots on the accuracy of task execution was found.

Evidence confirming this finding was reported by several later studies which focused more closely on individual screenshot functions. For example, Gellevij and van der Meij (2004) examined the effect of screenshots that were intended to support users comparing the current state of the software user interface with the intended goal state. They report that users working with a manual containing screenshots made fewer errors and executed actions steps supported

by screenshots faster. Gellevij, van der Meij, de Jong, and Pieters (2002) investigated whether screenshots also support the development of a mental model of the user interface, again contrasting a manual version containing screenshots with a text-only version. Users working with the screenshot manual completed training faster and scored higher on tasks designed to measure learning effects. Like van der Meij (1996), both studies provide important hints regarding global effects of screenshots on task execution and learning. However, since all studies discussed so far directly contrasted a visual manual version with a text-only version, it remains open why these effects arise and what contributions individual design variables such as visual signaling make.

While the studies discussed so far clearly demonstrate that including screenshots in manuals can have a positive effect on task performance and learning, other studies failed to find such effects (van der Meij & Gellevij, 2002; Nowaczyk & James, 1993), suggesting that effects induced by screenshots are subject to boundary conditions. For example, the results reported in Sweller and Chandler (1994) provide preliminary evidence that screenshots only support user performance if the task to be solved is sufficiently complex. The critical role of design variables as possible boundary condition for screenshot effects has been emphasized in a different line of studies by van der Meij, Gellevij, and colleagues. Gellevij, van der Meij, de Jong, and Pieters (1999) addressed screenshot coverage as design variable. Their study compared a text-only version of a manual with two types of visual manuals that differed with respect to the screenshot area depicted by screenshots: a visual manual version in which screenshot coverage was restricted to elements relevant in the context of a specific task, and a visual manual version containing screenshots covering the full screen. Overall, the results suggest that coverage had an effect: Participants working with a partial-screenshot manual performed worse on several measures, such as performance on untrained tasks, compared to participants working with a manual containing screenshots that captured the full screen. Interestingly, participants using text-only manuals also tended to outperform participants using manuals with partial screenshot.

In addition to screenshot coverage, van der Meij (2000) also tested effects of the positioning

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of screenshots relative to related text segments by comparing different layout variants that arranged screenshots and text segments in adjacent columns. The study replicated the finding that full-screen screenshots lead to better performance than partial-screen screenshots, but only if the instructions were positioned in the left column and the screenshots to the right. Similarly, Martin-Michiellot and Mendelsohn (2000) included a manual version with juxtaposed screenshots and a manual version in which text elements and corresponding screenshot areas were integrated more closely by using callout lines. In addition, this study also manipulated the complexity of the tasks that subjects had to perform for test purposes. Although both types of visual manuals accelerated training time compared to a text-only control version, there was no significant difference between juxtaposed and integrated screenshot conditions on task performance, neither for simple nor more complex tasks.

Taken together, prior research clearly backs the use of screenshots in software documentation. This research also points to conditions that screenshots have to meet in order to be effective. However, whether visual signaling contributes to effects of screenshots on user performance is still an open question.

## Background on Eye Tracking

Besides addressing an issue that is still unexplored, the current study also extends prior research on screenshots by using eye tracking. The eye tracking method makes it possible to determine with a high degree of accuracy where people look at a certain point in time (Holmqvist et al., 2011; Williams et al., 2005). To determine where people look, special eye tracking hardware is used which measures the gaze position of a user in very short intervals continuously over time. The eye tracker used in the current study—the RED 250mobile system from SensoMotoric Instruments (SMI)—recorded the gaze position at a rate of 120 Hz, which means that a gaze position measure was taken roughly every 8 milliseconds. Based on this continuous data stream, analysis software can then model various types of eye movement events.

The eye movement events of relevance to the current study (and for most studies in the field of usability) are fixations and saccades. Fixations are intervals of 200–500 milliseconds in which the gaze position remains rather stable and in which the eyes

can take in visual information (Cooke, 2005; Goldberg & Wichansky, 2003). Saccades refer to the rapid movements which the eyes must perform in order to fixate on another position in the visual field. Based on the observed pattern of fixations and saccades, it is possible to infer which information observers attend to (e.g., while reading, examining a webpage, or interacting with a software system). Research using eye tracking is based on the general assumption that the information a user visually attends to correlates highly with the thoughts or mental activities the user is involved with ("eye-mind hypothesis," Goldberg & Wichansky, 2003, p. 507).

Eye tracking has been used successfully for many years to study reading, text comprehension, scene perception, or multimedia learning (Rayner & Pollatsek, 2006; Rayner, 2009; Mayer, 2010). Eye tracking has also become a prominent method to explore various aspects of Web usability, such as screen design, navigation architecture, or processes of visual search (Cooke, 2005; Cooke et al., 2008; Duchowski, 2017; Nielsen & Pernice, 2010). Moreover, eye tracking can make verbalizations obtained from participants in concurrent think-aloud tests more informative (Cooke, 2010; Elling, Lentz, & de Jong, 2012).

The current study uses eye tracking to study the impact of a specific design decision (adding signaling elements to screenshots) on which information users attend to when working with technical documentation to solve a problem. At a more general level, the study can be viewed as an attempt to extend the range of applications for eye tracking in technical communication research and to explore a new way in which this method can be used to further our understanding of how people read and apply technical information.

## Research Objectives and Predictions

To sum up, the research reported here was designed to address two objectives. One objective was to test whether visual signaling indeed guides visual attention to relevant information in a screenshot, or whether signaling more generally increases interest in pictures. A second objective was to find out whether visual signaling has a positive impact on the accuracy and efficiency of task execution.

The hypotheses guiding the current study are based on the Cognitive Theory of Multimedia Learning

# Effects of Visual Signaling in Screenshots

(CTML; Mayer, 2009; Moreno & Mayer, 2007), which attempts to model the process of learning from material containing text and pictures. CTML distinguishes three types of processes that compete for working memory capacity when learning from multimedia material. CTML uses the terms "essential processing" and "generative processing" to refer to processes which are necessary for learning to take place, such as selecting information for processing in working memory, developing verbal and pictorial representations for incoming information, as well as integrating verbal and pictorial representations with information that already exists in long-term memory. Besides essential and generative processing, working with multimedia material may also trigger processes which are unrelated to learning and which result from the way multimedia material is presented to the learner, such as efforts to identify relevant information in texts or pictures, or to connect text and picture elements that contain related information. These processes are referred to as "extraneous processing."

According to CTML, signaling helps the learner because it reduces extraneous processing (Mayer, 2009, p. 108ff.). By reducing extraneous processing, signaling frees up working memory capacity which then becomes available for cognitive processes related to learning. Several studies have already demonstrated that both verbal and visual signaling can foster learning, and more specifically, can successfully direct the attention of the learner to relevant information (see Mayer, 2009, and Richter et al., 2016, for reviews). So far, however, this research has focused on "reading-to-learn" scenarios in the sense of Redish (1989), e.g., scenarios in which learners study material in order to understand how lightning is formed or how a pump works. However, procedures contained in manuals, online help, or tutorials are often not read with the intention to learn the series of action steps described there but with the goal to directly execute the steps in order to accomplish a certain goal, a scenario which Redish (1989) characterizes as "reading-to-do."

Only few attempts have been made so far to investigate whether results obtained by research on multimedia learning in "reading-to-learn" scenarios generalize to procedural text that is "read-to-do," but at least preliminary evidence is available suggesting that it does (Irrazabal, Saux, & Burin, 2016; van Genuchten, Hooijdonk, Schüler, & Scheiter, 2014). With respect to the current study, I therefore take CTML to motivate the prediction that visual signaling supports the user in allocating more visual attention to relevant areas of a screenshot. Hence, this theory leads us to expect that more fixations and longer fixation times should be observed in a relevant screenshot area if signaling is used. Since signaling reduces working memory capacity required for extraneous processing, making this capacity available for other cognitive processes involved in solving the current task, I also derive the hypothesis that visual signaling improves overall task performance.

## Method

### Materials

For the test, I developed a short tutorial that described how to add a colored picture frame around a digital image using GIMP (www.gimp.org), an open source image manipulation program similar to Adobe Photoshop. The tutorial was created in German, as the participants were native speakers of German (see section Participants below).

The tutorial consisted of 12 pages. It started with a short introduction (2 pages) which explained the goal of the tutorial, illustrated the initial state and the intended result, and described relevant elements of the user interface. The process to create the picture frame was divided into 8 sub-tasks (procedures) that contained 2 to 5 action steps each. The tutorial was completed by a page that congratulated the participants for completing the tutorial and again displayed the intended result. An example illustrating the tasks is given in Figure 1. The task describes how to apply one of the filters offered by GIMP in order to create a blur effect on a layer that will later be part of the picture frame. The four action steps instruct the reader to select the correct layer from a list, to launch the filter, to add values that control how intense the blur effect will be, and to apply the settings by clicking OK.

In each task, one or two of the action steps were supported by screenshots. Screenshots were inserted at points that were judged by the author to potentially lead to errors. Screenshots were intended to help participants to locate and identify user interface elements, and to compare the current state of the user interface with the intended goal state. Following design recommendations in Gellevij et al. (2002), screenshot

size and coverage were optimized depending on screenshot function. Each tutorial task was designed to fit on a single screen page, except one task which had to be distributed over two pages due to the size of the screenshots used.

To address the research questions of the current study, I created two versions of the tutorial that contained identical instructions but that differed with respect to whether the screenshots used visual signaling elements or not. The first version (condition "signaled") included screenshots to which arrows, frames or magnifiers were added in order to highlight relevant information, such as fields in the GIMP user interface



**Figure 1. Example page of the tutorial in condition "signaled." The task describes how to apply one of the filters offered by GIMP in order to create a blur effect. The blur effect is used on the layer that will later serve as part of the picture frame. The steps instruct the reader to select the correct layer from a list, to launch the filter, to add values that control how intense the blur effect will be, and to apply the settings by clicking OK.**

for which values had to be checked or changed, buttons on which participants were to click or elements to select from a list. For example, in the task shown in Figure 1, an arrow was added to the screenshot following step 1 to help the user identify which of the two elements to select from a list of available layers. The screenshot following step 3 uses a frame to emphasize the fields into which values have to be entered to control how intense the blur effect will be. The second tutorial version (condition "nonsignaled", see Figure 2) contained the same screenshots, but without signaling elements.

Participants were instructed to work though the tutorial and to execute the tasks described therein. Special care was taken to create a task setting that was as natural as possible and encouraged normal reading. Therefore, the tutorial was presented on a computer screen adjacent to the GIMP program (see Figure 3); hence, the tutorial and the GIMP software were available to the user simultaneously.



**Figure 2. Example page of the tutorial in condition "nonsignaled"**

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## Procedure

The experiment was run in the usability lab of Merseburg University of Applied Sciences and comprised two parts. Participants first received a short questionnaire that contained four questions regarding age of participants, level of computer experience, general experience with image manipulation software, and specific experience with GIMP. After the questionnaire was completed, participants received instructions for the test. They were then positioned in front of the test monitor and a calibration procedure was run to prepare the eye movement recording. Participants then started to work on the tasks described in the tutorial. Participants were instructed to work with the tutorials as they would normally. No special emphasis was put on reading the tutorials. Statement of consent was obtained from the participants at the beginning of each session.

While participants worked through the tutorial, their eye movements were recorded using an RED 250mobile eye tracker. The RED 250mobile is a video-based eye tracker that operates in head-free mode. For the test, the eye tracker was attached to a 24-inch monitor that served for stimulus presentation. Tracking rate was set to 120 Hz, and data were recorded from both eyes simultaneously. The software package ExperimentSuite Scientific 3.6 (also from SMI) was used for data recording (ExperimentCenter) and analysis (BeGaze).

The tutorial was displayed as a series of JPEG pictures using the Windows 7 Photo Viewer. The Windows 7 Photo Viewer was chosen because it features salient back and forward navigation buttons that are easy to operate and that participants used to navigate through the document. The tutorials were presented alongside GIMP on the stimulus monitor using windows of fixed size and position. The tutorial was presented to the right of GIMP and occupied about one third of the monitor area. The remaining monitor area was occupied by GIMP (see Figure 3).

During each session, the SMI software recorded a screen video onto which gaze data were mapped later for analysis purposes.
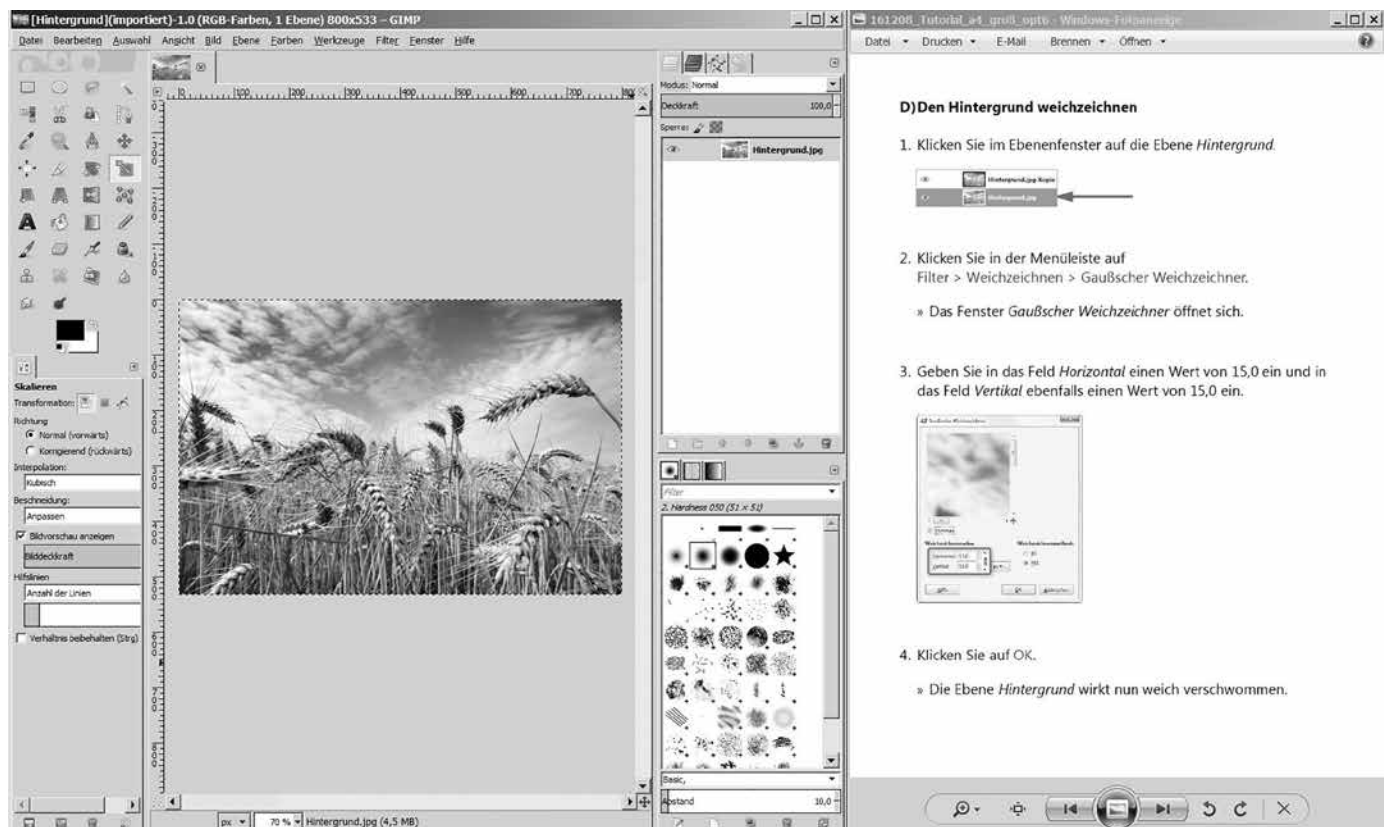


**Figure 3. Positioning of tutorial and GIMP on the stimulus presentation monitor**

## Participants

32 students (14 female, 18 male) were recruited from Merseburg University of Applied Sciences as participants for the experiment. Participants were native speakers of German and unaware of the purpose of the experiment. All participants had normal or corrected-to-normal vision. The participants were randomly assigned to one of the two conditions, resulting in 16 participants per condition. Mean age was 27.6 years (median= 27, min = 21, max = 42). Mean experience with image manipulation programs rated on a Likert scale ranging from 1 ("very experienced") to 6 ("no experience") was 2.78 (median=3). Mean experience with GIMP rated on the same scale was 5.40 (median=6), and general computer experience was 1.75 (median=2). In sum, participants were experienced computer users with some experience with image manipulation programs but no significant prior exposure to GIMP. Rating data are summarized in Table 1 individually for the two conditions. Mann-Whitney U-tests on the rating data confirmed that there were no significant differences between the groups regarding general computer experience (W=136, p=0.76), general experience with image manipulation programs (W=136, p=0.76), or experience with GIMP (W=132, p=0.87).

**Table 1. Participants′ self-assessments of general computer experience, general experience with image manipulation programs and experience with GIMP. Means per experimental condition with medians in parentheses.**

| Rating | Condition | |
|---|---|---|
| | signaled | nonsignaled |
| General computer experience | 1.75 (1.5) | 1.75 (2.0) |
| General experience with image manipulation programs | 2.75 (2.5) | 2.81 (3.0) |
| Experience with GIMP | 5.31 (6.0) | 5.5 (6.0) |

## Dependent Variables

Four dependent variables were used to examine effects of visual signaling. Accuracy of task execution and the time participants needed to complete the tasks were intended as measures to inform about the participants' overall performance on the tutorial task. Fixation times and number of fixations were selected as eye tracking measures to examine whether or not visual signaling effectively guides visual attention.

### Accuracy on tasks

To determine the accuracy of task execution, I coded for each of the 8 tasks whether participants had executed the task correctly or not. Task execution was scored as correct (coded by value "1") if participants correctly executed all action steps required by the task. If one or more of the action steps were not executed as described in the tutorial, the task was scored as incorrect (coded by value "0"). Scoring was done by post-hoc inspection of the screen videos produced by the SMI software during the eye tracking session for each participant. All coding was done by the author, no additional coders were involved.

### Time for task completion

The screen videos also formed the basis for analyzing the time participants needed to complete the tutorial. Like task accuracy, time for task completion was obtained on a per-task basis using the time stamps that were recorded automatically with the screen videos. For each task, the start time was defined by the time stamp of the first video frame on which the tutorial page for the respective task was open. Likewise, the end time was defined as the time stamp of the last video frame, immediately before participants opened the tutorial page for the next task. Time for task completion for each task, then, is the difference between the time stamp for end time and start time.

### Fixation times and number of fixations

To determine the number of fixations and fixation times, two different types of so-called "areas of interest" (AOIs) were defined: "screenshot" and "relevant area." The AOI "screenshot" encompassed the screenshots on each page of the tutorial. The AOI "relevant area" was embedded into the AOI "screenshot." This AOI marked the area that was relevant in the context of the current task and was therefore highlighted in the condition "signaled." All AOIs were applied to the conditions "signaled" and "nonsignaled," and drawn manually using the BeGaze AOI editor.

Since the pages for tasks 1–8 of the tutorial differed regarding how many screenshots were used, as well as their size and position, special care had to

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be taken to ensure that the AOIs used on the different tutorial pages were identical in size and occupied identical positions across the conditions "signaled" and "nonsignaled." I therefore first defined the AOIs in the condition "signaled," then exported the AOI definitions and afterwards reimported them to the data set of condition "nonsignaled." Positioning of AOIs is illustrated in Figure 4, which also shows an individual scan path pattern for one of the tutorial pages.

For identifying fixations and saccades, BeGaze was used with unmodified default settings for event detection. Prior to analysis, data for fixation times and number of fixations were inspected visually for outliers. Since no clear outliers could be identified, no data were excluded.

## Data Analysis

All statistical analyses reported in this paper were conducted using the statistics software R, version 3.4.2 (R Core Team, 2017). The data were analyzed with mixed-effects regression modeling (Baayen, Davidson, & Bates, 2008) using the lme4 R package (Bates,

Mächler, Bolker, & Walker, 2015). Over the last decade, this technique has become a standard method of analysis in psycholinguistic studies, both for the analysis of continuous outcomes (such as fixation times in this study) and for the analysis of categorical data (such as task accuracy). There are various reasons why mixed-effects modeling has been adopted so widely, which are discussed in detail in Baayen et al. (2008) and Jaeger (2008), among others (for a nontechnical introduction, see Balling, 2018). I selected this technique because, in contrast to alternative methods such as analysis of variance (ANOVA), mixed-effects regression modeling makes it possible to control for multiple random effects in a single analysis, such as random variation that is due to the particular selection of stimuli, or systematic differences between participants. In the present study, random effects for tasks were included besides participants in order to capture variance, which is due to individual properties of the 8 tutorial tasks and the screenshots they contained, such as differences regarding screenshot size,
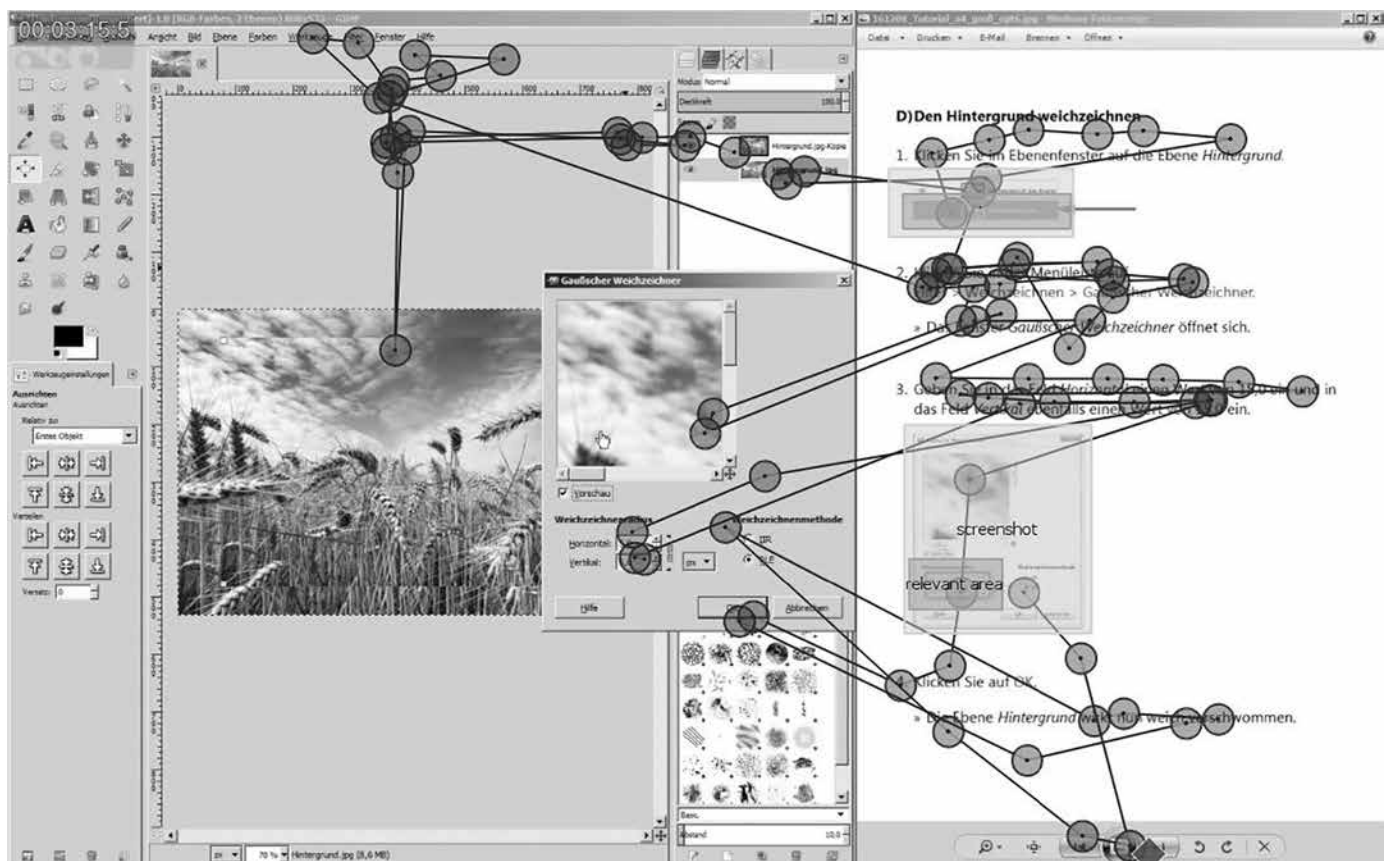


**Figure 4. Positioning of AOIs "screenshot" and "relevant area" and sample scan path**

function or positioning as well as size and proportion of AOIs. A significant effect of a fixed factor in such a model therefore reflects differences that persist after the variance introduced by the particular set of participants and tasks has been identified and controlled for.

Regarding the procedure to follow when constructing a mixed-effects model for confirmatory hypothesis testing, several approaches have been proposed which differ mainly with respect to the random effects structure that models should include (Barr, Levy, & Scheepers, 2013; Bates, Kliegl, Vasishth, & Baayen, 2015; Matuschek, Kliegl, Vasishth, Baayen, & Bates, 2017). I followed Matuschek et al. (2017) and Bates, Kliegl et al. (2015) who recommend using the most parsimonious model that can be assumed to have generated the observed pattern of results. To identify the most parsimonious model, I first constructed a model with the maximum random effects structure supported by the factorial design (Barr et al., 2013). The model was then simplified in an iterative manner by identifying and removing parameters from the random effects structure with the smallest variance contribution. This process was continued as long as the simpler model did not differ significantly from the preceding model in terms of goodness of fit.

In the results tables below, the final models arrived at are provided using the notation of (Bates, Mächler et al., 2015) which specifies the dependent variable, the independent variable(s) entered as fixed effect(s) and—using parentheses—the random effect terms. Note that the random effect terms may differ from analysis to analysis, which is a consequence of the iterative approach used here.

## Results

### Accuracy on Tasks

Mean accuracy scores and standard errors for each of the two tutorial conditions are provided in Table 2. As Table 2 shows, accuracy on tasks was higher in condition "signaled" compared to condition "nonsignaled."

**Table 2. Mean accuracy scores as proportion of tasks solved correctly (in %) and standard errors**

| signaled | nonsignaled |
|---|---|
| 96.88 (1.40) | 82.03 (3.60) |

To analyze the effect of visual signaling on how accurately participants solved the tutorial tasks, a logistic mixed-effects analysis using the glmer function of the lme4 package was conducted, which is suited for the analysis of binary dependent variables (Jaeger, 2008). Since each participant contributed accuracy values for each of the 8 tutorial tasks, the analysis was based on a total of 256 observations. The mixed-effects model included the factor "screenshot" with levels "signaled" and "nonsignaled" as fixed effect. Table 3 reports the parameter estimates of the model, the standard errors, the resulting z-values, and the associated probabilities. The analysis reveals that accuracy on tasks was significantly higher for condition "signaled" compared to condition "nonsignaled."

**Table 3. Results of mixed-effects model for task accuracy**

| Contrast | Estimate | Std. Error | z value | Pr(>|z|) |
|---|---|---|---|---|
| Formula: *score_correct ~ screenshot + (1|task)* | | | | |
| (Intercept) | 3.0423 | 0.5915 | 5.143 | < 0.001 |
| "signaled" vs. "nonsignaled" | 2.1184 | 0.5696 | 3.719 | < 0.001 |

## Time for Task Completion

As described above, time for task completion was also determined on a by-task basis, again yielding 8 observations for each of the 32 participants. The mean duration per task for each condition, along with standard errors, is shown in Table 4.

**Table 4. Mean time per task (in milliseconds) to complete the tasks and standard errors**

| signaled | nonsignaled |
|---|---|
| 38864 (1054) | 37846 (1441) |

The data for time to task completion reveal a slight advantage for condition "nonsignaled" compared to condition "signaled." Task duration data were analyzed using the lmer function of the lme4 package, including factor "screenshot" as fixed effect. Table 5 reports the parameter estimates, the standard errors, and the resulting t-values. Because exact probabilities cannot be computed for such models, I consider contrasts with a t-value greater 2 as significant (Baayen et al., 2008).

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**Table 5. Results of mixed-effects model for time to task completion**

| Contrast | Estimate | Std. Error | t-value |
|---|---|---|---|
| Formula: *duration ~ screenshot + (1|subject) + (1|task)* | | | |
| (Intercept) | 38355 | 3062 | 12.528 |
| "signaled" vs. "nonsignaled" | -1019 | 2034 | -0.501 |

As Table 5 shows, the difference between the means is not significant. I therefore conclude that the time participants needed to complete the tasks was not dependent on whether they worked with a tutorial containing screenshots with or without visual signaling.

### Fixation Times

In order to determine whether signaling techniques, such as colored frames or arrows, indeed direct visual attention to screenshot areas that are relevant in the context of a task, a second factor was defined that distinguishes relevant and irrelevant screenshot areas. Relevant screenshot areas are highlighted by signaling and contain the information that readers should attend to. In this study, these areas are designated by the
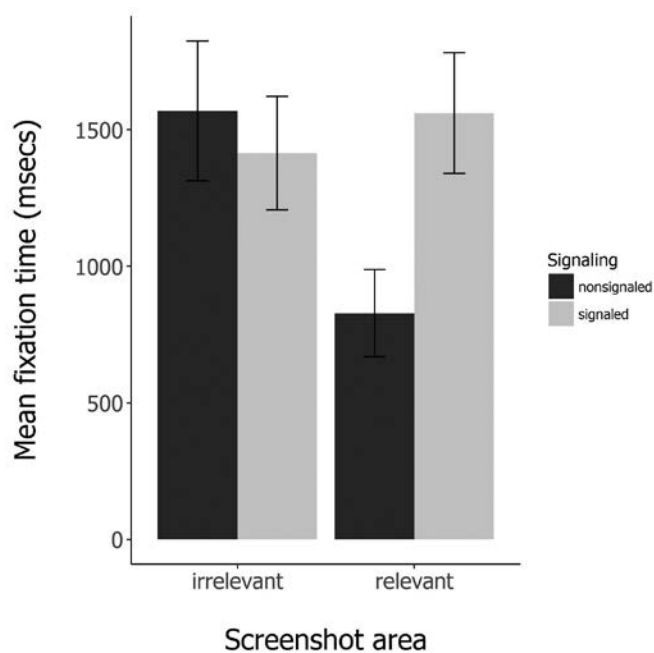


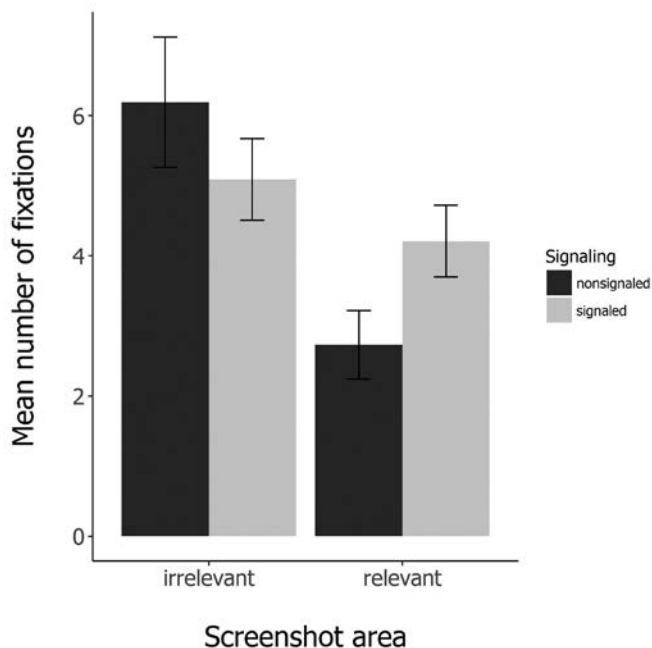**Figure 5. Mean fixation times per task in relevant or irrelevant areas of the screenshots depending on the availability of visual signaling. Bars represent 95% confidence intervals.**

AOI "relevant area" (see Figure 4). By definition, all screenshot information not included within the AOI "relevant area" is considered irrelevant in the context of the task at hand. Fixation times for irrelevant areas were computed by subtracting all fixations that landed in the AOI "relevant area" from the fixations collected by the AOI "screenshot," which marked the entire screenshot. Therefore, a 2x2 design resulted for subsequent analyses including the factor "area" with factor levels "relevant" and "irrelevant" in addition to the factor "screenshot" with levels "signaled" and "nonsignaled."

The mean fixation times for each of the four conditions are visualized in Figure 5 and are provided numerically along with factor means and grand mean as well as respective standard errors in Table 6.

**Table 6. Mean fixation times per task with standard errors in parentheses**

| screenshot | area | | |
|---|---|---|---|
| | relevant | irrelevant | mean |
| signaled | 1560 (112) | 1414 (106) | 1487 (77) |
| nonsignaled | 828 (81) | 1568 (131) | 1198 (80) |
| mean | 1194 (73) | 1491 (84) | 1343 (56) |

For statistical analysis, the lmer function of the lme4 package was used. The model included "screenshot" and "area" as fixed effects. Results of mixed-effects modeling are provided in Table 7.

**Table 7. Mixed-effects model for fixation times**

| Contrast | Estimate | Std. Error | t-value |
|---|---|---|---|
| Formula: *fixation_time ~ area \* screenshot + (1|subject) + (1 + area|task)* | | | |
| (Intercept) | 1342.6 | 195.0 | 6.886 |
| area | 296.8 | 276.4 | 1.074 |
| screenshot | -289.0 | 184.0 | -1.570 |
| area:screenshot | 887.1 | 176.4 | 5.028 |

As Table 7 shows, main effects were not significant, but there was a significant interaction between "area" and "screenshot." To explore the interaction further, I performed post-hoc Tukey HSD comparisons using the lsmeans R package (Lenth, 2016). The comparisons revealed a significant difference between the conditions

"signaled" and "nonsignaled" for relevant screenshot areas (1560 ms vs. 828 ms, t(45.21) = 3.59, p < .01), whereas the difference was not significant for irrelevant areas (1414 ms vs. 1568 ms, t(45.21) = -0.757, p = 0.45). I conclude that relevant screenshot areas indeed attract longer fixation times if visual signaling is used compared to when no visual signaling is used.

## Number of Fixations

Number of fixations was analyzed using the same 2x2 factorial design and the same approach to mixed-effects modeling. The respective condition means are shown in Figure 6 and provided along with factor means, grand mean, and standard errors in Table 8.

**Table 8. Mean number of fixations per task with standard errors in parentheses**

| screenshot | area | | |
|---|---|---|---|
| | relevant | irrelevant | mean |
| signaled | 4.21 (0.26) | 5.09 (0.30) | 4.65 (0.20) |
| nonsignaled | 2.73 (0.25) | 6.19 (0.47) | 4.46 (0.29) |
| mean | 3.47 (0.19) | 5.64 (0.28) | 4.55 (0.17) |



**Figure 6. Mean number of fixations per task in relevant or irrelevant areas of the screenshots depending on the availability of visual signaling. Bars represent 95% confidence intervals.**

The data resulting from mixed-effects modeling are summarized in Table 9. As is evident from Table 9, the analysis revealed a very similar pattern, which is not surprising as there is a very strong overall correlation between fixation times and number of fixations (r=0.93). The only difference is that the main effect of "area" now reached significance as well, but it is qualified by a significant interaction.

**Table 9. Mixed-effects model for number of fixations**

| Contrast | Estimate | Std. Error | t-value |
|---|---|---|---|
| Formula: *fixation_count ~ area * screenshot + (1\|subject) + (1 + area\|task)* | | | |
| (Intercept) | 4.55 | 0.64 | 7.166 |
| area | 2.16 | 0.85 | 2.540 |
| screenshot | -0.19 | 0.57 | -0.328 |
| area:screenshot | 2.58 | 0.52 | 4.916 |

Post-hoc comparisons show that the mean number of fixations is significantly different between the conditions "signaled" and "nonsignaled" for relevant screenshot areas (4.21 vs. 2.73, t(43.79) = 2.34, p < .05) and marginally significant for irrelevant screenshot areas (5.09 vs. 6.19, t(43.79) = -1.75, p = 0.09). I therefore derive the additional conclusion that relevant screenshot areas highlighted by visual signaling are not only fixated longer but also more often.

## Discussion

### Main Findings

The research reported here was designed to investigate whether and how visual signaling affects user performance in a "reading-to-do" scenario. More specifically, I wanted to know whether visual signaling in screenshots indeed directs visual attention of documentation users to the signaled areas. Related to that, I also examined whether directing visual attention to relevant screenshot areas would improve performance on executing the tutorial tasks.

Regarding overall user performance, I found a significant effect of visual signaling on overall task accuracy. Participants working with the tutorial containing screenshots with visual signaling made fewer errors compared to participants in the "nonsignaled" condition. No reliable difference between conditions

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was found for the time participants needed to execute the tutorial tasks.

Consistent with the effect of visual signaling on task accuracy, I found evidence that signaling triggers users to allocate more visual attention to screenshot areas that are relevant in the context of a certain task and therefore highlighted by arrows, frames or similar techniques. If relevant screenshot areas are emphasized, users fixate on them more often and longer compared to the condition in which no signaling was used. At the same time, I observed a tendency that irrelevant screenshot regions were fixated less often and with overall shorter fixation times. Taken together, the results imply that participants do not generally look more often or longer on a screenshot when visual signaling is used, but they look more often and longer at the right place, as is intended. This pattern of effects is consistent with accounts of visual signaling in the Cognitive Theory of Multimedia Learning (Mayer, 2009). According to this account, visual signaling does not simply increase overall interest in pictures but specifically helps the user to identify and select relevant information from a picture, thereby reducing the amount of working memory capacity that has to be devoted to extraneous processing.

## Practical Implication and Suggestions for Future Research

When designing screenshots for software documentation, whether or not to use visual signaling is one of the important design decisions that technical communicators have to make. The main practical implication of the current study is that the results—if confirmed by future studies—back the use of visual signaling in screenshots. The results suggest that signaling is a design dimension which supports positive effects of screenshots on user performance. Visual signaling elements guide the user's visual attention to relevant information. They help the user to identify relevant information, which improves user performance. In light of the findings reported here and findings from prior research, practitioners can derive the recommendation that they should consider using screenshots in software documentation containing procedures, but that screenshots should be designed properly to leverage their full potential. Screenshots are more helpful if they are enriched with visual signaling elements that relate to the task at hand and

appropriately support the communicative function of the screenshot.

Given that implementing and maintaining visual signaling elements is associated with investments in terms of time and resources, and given further that technical communicators typically work under pressure to reduce costs, the results of this study may provide an additional argument that can be used to justify these costs: The costs are justified because they contribute to making users more effective. In this sense, the study attempts to contribute to a line of research that helps to validate design decisions by demonstrating that they are grounded in empirical research supporting their supposed effects. This line of research has a long tradition in the field of technical communication (as shown, e.g., by van der Meij et al., 2009), and its relevance from a practitioner's point of view has been confirmed recently by Carliner, Coppola, Grady, and Hayhoe (2011), and St.Amant and Meloncon (2016).

The effect of visual signaling on the accuracy of task execution was statistically significant, but it was rather small numerically. Note that accuracy on tasks was fairly high in general and reached an almost perfect score in condition "signaled," which may have reduced the effect size. A follow-up study could use more complex tasks to check whether the effect size increases with increasing task complexity.

Although the current study demonstrates the effectiveness of signaling, it does not allow conclusions regarding which specific signaling techniques are effective in guiding the visual attention of the user and which aren't. Another question that future research needs to address is whether the effect of visual signaling is modulated by other factors, such as user experience or reading goals of the user. As discussed above, prior research on screenshots suggests that such interactions with other factors can play a role. Of course, knowing about relevant factors is of interest both from a theoretical and from an applied perspective. Note that the importance of understanding boundary conditions for design decisions has also been emphasized in research on multimedia learning (Mayer, 2009; Sweller, Ayres, & Kalyuga, 2011).

The eye tracking method and the specific experimental setup developed to study the reading behavior of users in a "reading-to-do" scenario have proven very useful, which suggests that eye tracking can help to address the questions for future research

raised above as well. A key feature of the experimental setup used here is that the software system and the documentation were presented simultaneously on the same screen. An advantage of this setup is that remote eye tracking systems can be used for data collection and that techniques for quantitative data analysis, such as the definition of areas of interest and comparisons across areas of interest, can be applied in an efficient way, simply because the screen provides a fixed point of reference.

This opens new possibilities to leverage the potential of eye tracking for determining accurately where users look while still allowing users to work with the software system and the respective documentation simultaneously in a fairly unconstrained way. In particular, the setup does not enforce a fixed sequence of reading and acting. Consequently, the setup described here opens the possibility of applying eye tracking to new areas of technical communication research that extend the scenarios discussed in Cooke (2005). One such possibility is to use eye tracking to study reading strategies and aspects of information selection in manuals beyond visual signaling. For example, eye tracking investigations could reveal which types of information users access spontaneously in manuals, at which point they access certain information (e.g., before, during or after carrying out an action), and which variables (e.g., reading goal or level of expertise) influence the section process (van der Meij et al., 2009; Ummelen, 1999).

Another area in which eye tracking—when used in a setup that enables parallel use of documentation and software system—can prove very useful is to study how users coordinate reading and acting in task execution, and how they switch attention between documentation and software system when working with procedures. Switching attention is an important process that mediates between selecting information contained in a manual and putting this information to actual use (Boekelder & Steehouder, 1998; van der Meij, 1998; van der Meij & Gellevij, 1998). An important task for future research is to determine which design techniques support the attention switching process effectively and, therefore, contribute to more effective and efficient task execution. For example, this study has shown that visual signaling in screenshots helps the user to identify screenshot information that is relevant in the context of the current task. With respect to attention

switching and the coordination between reading and acting, the question arises whether visual signaling also helps the user to locate the relevant parts of the user interface that are depicted by the screenshot and emphasized by signaling. Eye tracking may pave the way for a deeper understanding of attention switching processes, which in turn could lead to specific design recommendations that help add additional value to technical documentation.

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## About the Author

**Michael Meng** is a professor of Applied Linguistics at Merseburg University of Applied Sciences (Germany) where he teaches text production, research methods, and usability. Before joining the university faculty, he worked as a technical writer and localization specialist for an international software company. His research focuses on using empirical methods to study the effects of linguistic and design variables on the usability of information products in technical communication. Contact: michael.meng@hs-merseburg.de.

Jackie Damrau, Editor

# Books Reviewed in This Issue

## Social Media in Earthquake-Related Communication: Shake Networks

Francesca Comunello and Simone Mulargia. 2018. Bingley, UK: Emerald Publishing Limited. [ISBN 978-1-78714-792-8]. 196 pages, including index. US$95.00.]

Many studies have been conducted on communication during and after a natural disaster. The authors of *Social Media in Earthquake-Related Communication: Shake Networks* maintain that the research so far "appears fragmented and . . . based on single case studies." In addition, the "research seems to consider 'social media' as a whole, . . . or to look only at individual platforms". In this book, Francesca Comunello and Simone Mulargia attempt to intertwine study results from disparate fields; such as crisis informatics, crisis communication, science communication, and the sociology of disaster; to build a "comprehensive framework for analyzing the role of social media during natural disasters" (p. 1). The book results from an Italian research project in which seismologists and Internet study experts participated.

Previous studies have focused on top-down and bottom-up communication processes. To build their framework, the authors organize *Social Media in Earthquake-Related Communication* in four parts where they cross these two processes with information sharing and information gathering processes. In each quarter of the book, a review of existing international research is followed by earthquake-specific case studies of Italian citizens based on the research project. The result is four communication scenarios: top-down information sharing; citizen information gathering; institutional information gathering; bottom-up information sharing. These scenarios further sort into either a traditional or networked model.

A crisis, such as an earthquake, is not solely a scientific event. People react emotionally and need to adjust; they may want to provide information or assistance. By examining the research to date using their intersecting method, Comunello and Mulargia have determined that "disaster communication would benefit greatly from a stronger integration of different theoretical and empirical traditions" (p. 152). The bigger picture emerges when various perspectives are understood.

The research into social media use during natural disasters is limited and tends to treat the public only as recipients of institutional messages or sources of firsthand disaster information. Social media are not only two-way but multi-directional media where, besides communicating with institutions, individuals are sharing among themselves and creating a community response to the emergency. Again, Comunello and Mulargia recommend a broader approach to studying social media use that considers the social and psychological factors at play during and after a disaster.

Institutions themselves are slow to adopt social media, except to use them to distribute messages in the traditional way. They are vested in retaining control over the information being disseminated and mostly ignore the multi-directional communication capability of social media, even to take advantage of information they might glean from the public. The authors of *Social Media in Earthquake-Related Communication* believe institutions would benefit from using social media in emergency situations and that "institutions should exploit social media . . . to gain and maintain a significant status within the communicative network" (p. 160).

**Linda Davis**

Linda M. Davis is an independent communications practitioner in the Los Angeles area. She holds an MA in Communication Management and has specialized in strategic communication planning, publication management, writing, and editing for more than 25 years.

## Digital Marketing: Strategic Planning & Integration

Annmarie Hanlon. 2019. London, UK: SAGE Publications. [ISBN 978-1-5264-2667-3. 396 pages, including index. $51.00 (softcover).

*Digital Marketing: Strategic Planning & Integration* is a feast. There is so much to learn about the world of digital marketing. Even for those who are not working directly in the field, it contains important information for everyone. Say, for example, if you're an author or in the publishing business, you need to know something about the digital consumer and websites, blogs and search engines, social media, and virtual reality.

As each of these areas grows and matures, more is learned and written about them. What are the differences between the eight or nine major social media? And how have they changed over time? Annmarie Hanlon points out that they started out as ways of connecting people, and many have become big advertising companies and publishers.

What are the key elements in designing a successful website? How do you differentiate a digital native from a digital immigrant? Digital natives rarely watch TV in real time. They prefer YouTube. The norm has become mobile phones, tablets, and wearables. They use WhatsApp instead of writing letters. How do these different media affect the nature of the message? And what kinds of viewers do they tend to draw? Instagram's focus on pictures and images—tends to draw people in the fashion, tourism, and food sectors.

And how are all these media influenced by the Internet of Things (IoT): how do they all connect and interact? Many websites were designed for desktop PCs and often cannot be read on mobile devices. As a technical writer, it is important to know these things.

It's a moving target—so quickly are things changing. Take music, and the trend away from vinyl, cassette tapes, and CDs, and towards renting playlists via Spotify, Amazon, and iTunes music accounts. Every era sees disruption from newer technologies. Amazon disrupted the traditional book-selling market. Netflix disrupted the traditional video-rental market. There is an emergent culture of sharing what we have.

As for e-mail, worldwide use may be approaching 4 billion; with an estimated 270 billion e-mails a day by 2018. This will influence more things in our lives: our language, our interpersonal relationships, how and what we buy, how we think, and ultimately, our picture of reality.

*Digital Marketing* has an incredible breadth and depth of coverage. It is marred only by the endless flow of marketing jargon and the acronyms attached to them. While the terminology may work for marketing professors, it can cause real problems for their students and people not in the marketing field.

Some headings and text are done in light cocoa, yellow, or mauve— that are attractive. But rather than emphasizing the information, which is their intention, they are "harder" to read because of their minimal contrast with the background (see pp. 185, 205, 213, 266).

Still, there is much to be learned by reading this book.

**Steven Darian**

Steven Darian is an STC Fellow and Professor emeritus from Rutgers University, where he taught business and technical writing as well as other language-related courses. Steven's most recent book (2019) is the 2nd revised edition of *Technique in Nonfiction: The Tools of the Trade.* And due out later in the year, a slight digression: *The Wanderer: Travels & Adventures Beyond the Pale.*

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## Editing in the Modern Classroom

Suzan Flanagan and Michael Albers, eds. 2019. New York, NY: Routledge. [ISBN 978-0-8153-5446-8. 194 pages, including index. US$47.95 (softcover).]

How should technical editing be taught? What are the best practices in pedagogy, and what is the evidence, if any, supporting those practices? *Editing in the Modern Classroom* provides a few answers and argues for some research directions.

This collection of academic topics, nine chapters, is well written and researched. (However, as is typical for academic collections like this, the index is sparse and flat.) Each chapter begins with a list of takeaways that summarize the main points, usually with a focus on theory. And each chapter ends with a list of pedagogical practicalities that recommend teaching practices such as "Make clear to students that all practice [sic], including editing practices, are entangled in theory" (p. 106). Some of the chapters seem to deviate, exploring the side roads of their editing topics, and then they jump right back to the main topic, but in engaging ways. For example, the "Teaching Editing through a Feminist Theoretical Lens" chapter begins with a review of editing theory, includes a personal narrative, revisits the history of "Women in Editing Workplaces" (p. 96), argues how "feminist theory can help us understand how we work with texts and authors" (p. 100) including an extended example from an editor of a feminist journal, and ends with some examples of applying feminist theory to the editing course. I was engaged throughout the topics and only noticed the range when I tried to summarize the content.

Other chapters provide empirical research. The "Editing for Human-Information Interaction" chapter quantifies the types of editing marks made by

graduate students. Complete with charts, tables, and statistical analyses of various types of editing marks and comments, this chapter finds that "too many of the students…performed a line edit of a text . . . without evaluating if each sentence, paragraph, and section made sense" on the whole (p. 119). While this chapter makes some interesting discoveries, the research is based on "56 papers, a total of 1,567 comments" (p. 114).

I don't mean to suggest that this isn't statistically valid; I am suggesting that we need to repeat this study and conduct many others. I agree with two authors, Lisa Melonçon and Kirk St.Amant, from this collection who recently argued in the *Journal of Technical Writing and Communication* 2019, Vol. 49(2) 128-155 for more empirical research, noting that the current state of empirical research in the field "makes it near to impossible for this research to serve as a foundation for sustainable inquiry" (p. 150).

From discussions of editing software and tools to editing for international audiences to a survey of editing courses in technical communication programs, one theme emerges: We are just beginning to study this field. These chapters are an excellent contribution to the body of research, yet we need more research in this area.

**Kelly A. Harrison**
Kelly A. Harrison, MFA, teaches technical writing at Stanford University. In collaboration with a colleague, she recently received an NEH grant for curriculum development at San José State University, where she has taught a range of writing courses. She has written print and online content for various high-tech companies.

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### Cite Right: A Quick Guide to Citation Styles—MLA, APA, Chicago, the Sciences, Professions, and More
Charles Lipson. 2018. 3rd ed. Chicago, IL: The University of Chicago Press. [ISBN 978-0-226-43110-9. 180 pages, including index. US$15.00 (softcover).]
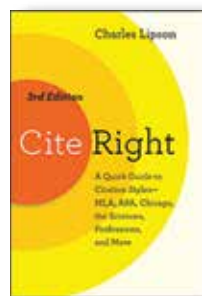
Charles Lipson has again provided an invaluable tool for researchers who must cite sources in their writing. Although he directly addresses students, experienced practitioners will also find the summary tables of citation styles helpful, particularly because requirements within specific fields are continuously changing.

Three of the 11 chapters focus on general points, including why we cite sources in the first place and basic approaches and rules. One piece of advice I greatly like: "*Don't bother trying to memorize any of these styles*. There are simply too many minor details. Just follow the tables [in this book], and you'll be able to handle different sources" (p. 11). The FAQs chapter addresses such questions as, "What about citing a work I've found in someone else's notes?" (p. 161). (Lipson does a real service here by explaining how to avoid promulgating that other person's errors.)

The central chapters present detailed, up-to-date tables and explanatory notations on the following editions of the major style guides:
- *Chicago Manual of Style*, 17th ed. (2017)
- *Publication Manual of the American Psychological Association*, 6th ed. (2010)
- *MLA Handbook*, 8th ed. (2016)
- *Scientific Style and Format: The CSE Manual for Authors, Editors, and Publishers*, 8th ed. (2014)
- *AMA Manual of Style*, 10th ed. (2010)
- *The ACS Style Guide*, 3rd ed. (2006)

This information, of course, will go out of date when publishers release new editions. Lipson helpfully notes where you can check for online updates to recommendations within a discipline.

A good deal has changed since the second edition of *Cite Right: A Quick Guide to Citation Styles—MLA, APA, Chicago, the Sciences, Professions, and More*. A major change is the elimination of the chapter covering the style guide of the American Anthropological Association, which, as of 2015, follows Chicago. (Lipson doesn't mention this detail but probably should have.) He accurately describes myriad revised material in the guides, such as MLA's use of the term *container* and their no longer recommending inclusion of the format of a source.

Unsurprisingly, you'll find expanded information tied to technological changes. Thus, more space is devoted to access dates for online material, apps, audio sources, e-books, online books, online comments, podcasts, social media (Instagram isn't mentioned in the second edition), and *Wikipedia*.

If you've enjoyed consulting the second edition of *Cite Right*, it's time to get the affordable third edition. Like me, you'll want to keep it within easy reach of your keyboard.

**Avon J. Murphy**

Avon J. Murphy is an STC Fellow and technical editor in western Washington. A retired college professor and government writer, he is a contractor, and principal in Murphy Editing and Writing Services, specializing in computer and Web technologies. Avon served as book review editor for Technical Communication for 17 years.

## The Compass and the Radar: The Art of Building a Rewarding Career While Remaining True to Yourself

Paolo Gallo. 2019. London, UK: Bloomsbury Business. [ISBN 978-1-4729-5879-2. 288 pages. US$28.00.]
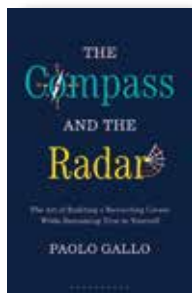
The *Compass and the Radar: The Art of Building a Rewarding Career While Remaining True to Yourself* is an authentic guide to choosing a fulfilling career and navigating the complexities of organizational culture. Paolo Gallo takes readers on a journey powered by a "**compass**, an instrument focused on our inner and deepest values... and a **radar**, which "helps us discover the obstacles, the danger as well as the opportunities we will encounter" (p. 3).

The journey to fulfillment begins with exploring our passions and values so that we can identify a career that lets us remain true to ourselves. The first phase requires creative thinking as we explore our personal and professional identities. Gallo's thought-provoking questions provide tools for self-reflection, coupled with simple advice such as "Think of the last time you were so absorbed and concentrated in an activity that you forgot about the time that flew by" (p. 27).

The second phase involves interviewing at relevant companies and determining if they're a good fit, negotiating the job offer, and forging smart relationships with our peers and superiors. This requires a solid understanding of company culture. According to Gallo, "Company culture is what *the organization is, as opposed to what it does*, sells, has or earns" (p. 36). To know what an organization "is" we'll first need to gain the trust of our colleagues—and then they must earn ours. Gallo helps us understand who we can trust by categorizing different types of colleagues into groups based on two qualities: "political intelligence, and the orientation to work for oneself or for the organization" (p. 130).

According to Gallo, "There are only two ways to build a career: as decent people or not" (p. 179). These words define the final phase of Gallo's journey, in which we learn the importance of "deciding ***whether or not to be free***" (p. 174). This means we must avoid corruption and blind obedience, learn to balance confidence with humility when amongst our colleagues, and form relationships with trustworthy, respectable leaders.

Gallo's journey is heavily intertwined with anecdotes, both real and imagined, to illustrate key points. There's a predominant focus on office culture and career advancement that could perhaps be balanced with additional references to jobs outside the office and the potential to create new value in one's current role, respectively. *Compass and the Radar* undoubtedly speaks volumes to those looking to start or change careers in business and is a good reminder for anyone regardless of career or situation. The ability to navigate culture, cultivate relationships, and remain decent people are purely human traits that should never be overlooked as factors for fulfillment.

Gallo's advice couldn't be more relevant for us as technical communicators. Our work requires us to quickly learn and adapt to new products and tools, work with different individuals and teams, and take on shifting responsibilities to remain relevant in our organizations. And as technical communication continues to evolve in the information age, learning what "success" and "fulfillment" means to each of us is a critical factor for our industry's success.

**Amy Dunbar**

Amy Dunbar is an STC member and a technical writer for Pearson VUE in Bloomington, Minnesota. She has a degree in biology and a graduate certificate in technical communication from the University of Minnesota. Amy's professional interests include content marketing and video production.

## Iterate: Ten Lessons in Design and Failure
John Sharp and Colleen Macklin. 2019. Cambridge, MA: MIT Press. [ISBN 978-0-262-03963-5. 300, including index. US$29.95.]
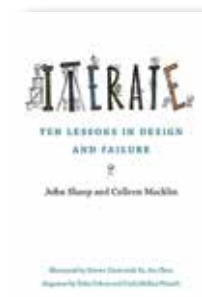
*Iterate: Ten Lessons in Design and Failure* targets creative practitioners as well as anyone interested in the creative process. Rather than a practical guide of actionable steps, this book is an academic analysis of a range of iterative processes.

John Sharp and Colleen Macklin's thesis is that failure is the heart of the creative process, because it exposes weaknesses and redirects the iterative process. The first portion of the book defines creativity, failure, and iteration, and examines the relationship between all three. The authors suggest: "Think of failure as a flashlight; it illuminates the things that don't work and also, when we look closely, shines light on the path ahead toward the next version of an idea, and ultimately, the realization of a thing in the world" (p. 57).

The bulk of the book is a series of case studies in pairs, putting two creative practitioners on opposite ends of a continuum. Each pair explores one of the five types of continua of iterative practices defined by Sharp and Macklin, from material to reflective, targeted to exploratory, and more. The case studies themselves are easy to read and are fascinating looks into an array of creative practitioners: a winemaker, a filmmaker, a radio producer, a professional skateboarder, and others. The authors' selected case studies "look closely at a variety of practices to help us see the complexity of creativity and its relationship to failure, but also to see the possibilities for iteration when viewed more closely" (p. 83). In other words, every iterative process is different.

While the case studies are easy to read, the rest of *Iterate* is academic in tone and the authors define things to death, which makes it inaccessible for the casual reader. The first chapter, "Creativity," introduces four dozen key terms for readers to digest, and juggling the eight types of failure, the five continua of iteration, and other such dissections left my head spinning. However, Sharp and Macklin do use everyday examples (baking cupcakes, for one) to illustrate their terms, and there are numerous humorous illustrations to reinforce the content.

*Iterate* shows that a single iterative process is not translatable across practices or practitioners. Practically,

the authors suggest goal setting to measure failure and find points for improvement. Setting small goals is the key to "Failing Better," the final chapter's title. Goal setting lets us assess, recognize failure, and make changes accordingly: "This is the key to the whole business of iterative creative practices: always trying again, being open to learning from your failures so that you might be that much better when you start the process over" (p. 251).

I would recommend *Iterate* to academics or those interested in a detailed analysis of iteration's role in the creative process. It is well-researched and highly detailed with plenty for serious readers to digest.

**Bonnie Winstel**
Bonnie Winstel is the product specialist for a small software company in Huntsville, Alabama. She has a master's degree in English and Technical Communication from the University of Alabama-Huntsville.

## Seeing Science: An Illustrated Guide to the Wonders of the Universe
Iris Gottlieb. 2018. San Francisco, CA: Chronicle Books. [ISBN 978-1-4521-6713-8. 152 pages, including index. US$22.95.]
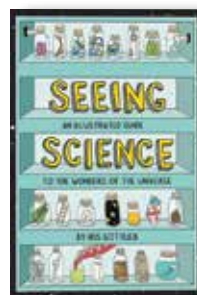
Iris Gottlieb's book *Seeing Science: An Illustrated Guide to the Wonders of the Universe* is a work of art. As she says in the introduction, "I want to open up the world of complex science with art and metaphor and storytelling. It is my hope that this book makes science more accessible, less intimidating, and more magical to anyone who has a sense of wonder—and a sense of humor" (p. 7). This book is artistic, full of odd scientific facts, and has references to popular culture.

The book is organized in three parts: life science, earth science, and physical science. Each part has a two-page spread to signify the start of the section and includes a small statement defining the part, a list of the related scientific fields, and a unique illustration. The pages in each part are much the same with a heading, subheading, applicable text, and colorful illustrations. Each page is designed to be aesthetically pleasing with exceptional use of color, negative space, illustrations, and text.

One of my favorite pages has an illustration of a frame containing the image of a pigeon with a sash that reads, "Did Things" (p. 57). The caption beneath the illustration reads, "Cher Ami was a homing pigeon who served in World War I. He flew 25 miles to deliver a message that saved 194 soldiers, but got shot and lost an eye and a leg in the process. Medics saved him and carved him a tiny wooden leg" (p. 57). The illustration is part of a spread about pigeons which includes a couple paragraphs explaining their "natural GPS systems" and theories for how it works.

While *Seeing Science* is aesthetically pleasing, I didn't think it was truly effective as a tool for technical communication. The information in the book is interesting, but the actual text is difficult to read. The paragraphs of text on each page are in a sans serif, uppercase font in which the letters are slightly different sizes. It is beautiful and fits the whimsical nature of the book; however, my eyes couldn't move over the text easily. To cause further frustration, the headings and subheadings are all in a clean, title cased sans serif font that is easy to read. Even the introduction in the front of the book and index and acknowledgements in the back of the book are in the same easy-to-read font. I would have preferred, and believe it would have better served the material, to have the whimsical font for headings and the paragraphs of text in more legible font.

In aesthetics alone, *Seeing Science* is amazing. I immensely enjoyed the illustrations and appealing design. But I believe Gottlieb failed in her effort to make "science more accessible" by using a font that doesn't adequately serve the content or the reader.

**Sara Buchanan**
Sara Buchanan is an STC member and a content strategist at LCS in Cincinnati, OH. In her free time, she's an avid reader, enjoys cooking, and doting on her cats, Buffy and Spike.

## Writing for the Design Mind

Design students have two big problems when it comes to writing: fear that they don't have the ability to write, and the misconception that there's no need for them to hone this skill. Natalia Ilyin in *Writing for the Design Mind* attempts to tackle these problems and to provide tips, techniques, and general guidance that will help anyone improve their writing. She addresses these main issues early in the introduction by explaining that, like anything else, if you want to get better at writing, you need to practice, and that many well-known design professionals are all writers. It is these writers who contribute to the current theory, criticism, and dialog surrounding design. Ilyin also explains that designers write all the time; they write emails to clients, business proposals, and have even been conscripted to write advertising copy occasionally, and, therefore, knowing how to write clearly is an essential skill.

The author approaches the subject of learning to be a better writer in a light-hearted, humorous manner, thus making the book a surprisingly fun read. *Writing for the Design Mind* is both a fast and a slow read. While the content is handled in an approachable way, the exercises that accompany the book support the content and are designed to help the reader apply the described techniques to improve their writing. These exercises do slow down the reading as they are distributed throughout the text and often designate a recommended timeframe of 45 minutes to complete; some even recommend multiple 45-minute sessions, while others are a bit shorter.

Ilyin identifies her target audience as both design students and working professionals, and there is language that is directed at design audiences as well as inside jokes that only designers might enjoy, such as "Pardon me while I drop this shadow" (p. 27). Yet despite this, anyone who wishes to improve their writing is likely to enjoy the book, but they might not get all the jokes and design references. Most importantly, there is something for everyone, and even the most proficient writers would likely gain some new skills or knowledge from this book.

*Writing for the Design Mind* echoes some of the great writing books that many have turned to over the years to improve their writing and their output including Strunk & White's *The Elements of Style*, Silvia's *How to Write A Lot* and Zinsser's *On Writing Well*. Ilyin even encourages her readers to read *The Elements of Style* in place of completing an exercise in chapter five. Anyone who reads Ilyin's book and completes all the exercises, 25 in all—not including the assigned reading of *The Elements of Style*, will certainly become a better writer, and in doing so will be able to take part in creating the dialog, as Ilyin explains, to become leaders in design.

**Amanda Horton**
Amanda Horton holds an MFA in Design and currently teaches graduate and undergraduate courses at the University of Central Oklahoma (UCO) in the areas of design technology, design studio. and history of graphic design. Ms. Horton is also the director of the Design History Minor at UCO.

## The Creativity Code: Art and Innovation in the Age of AI

Marcus du Sautoy. 2019. Cambridge, MA: The Belknap Press of Harvard University. [ISBN 978-0-674-98813-2. 312 pages, including index. US$30.00.]
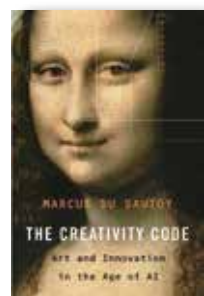
In *The Creativity Code: Art and Innovation in the Age of AI*, Marcus du Sautoy alludes to the power artificial intelligence (AI) has over almost every aspect of our daily lives: from a multitude of apps on our phones that cater to our every whim and necessity, to the elaborate computer programs used in medicine, economics, and other sciences. The algorithms that make these things possible were created by people for people using a top-down programming approach.

But this book's main goal is to call the reader's attention to the fascinating, if controversial, trends that have been appearing on the AI horizon. Nowadays, computer algorithms have begun to chart new territory in art, music, and literature.

The modern generation of coders is trying to prove the possibility for the code to program itself using a bottom-up model; a model that might give the machine

itself the ability to create an emotionally moving piece of art or music. But can a machine achieve a level of creativity like humans? How can it go beyond "the creativity of its coder or a person who built its data set" (p. 6)?

In the following chapters, du Sautoy discusses each field in depth to help us understand if or when the human creativity code could be cracked by machines. We learn pertinent information on the nature of algorithms, their creation, and ways of training them using huge data sets. We then follow the process of how algorithms evolve and become better at achieving set goals; reliving the battle between AlphaGo, a program created by DeepMind, and the best Go player in the world who was defeated by this self-learning code.

In other chapters, we steadily build up our understanding of painting, the captivating details of musical composition; the logical steps required for a mathematical proof; the development of a song-writing formula; the intricacies of human languages and translation; and poem and novel writing. In a gentle, simple, engaging way, du Sautoy masterfully explains the workings behind each field by infusing the material with a healthy dose of mathematics and computer science. In addition, each chapter contains a brief account of how a top-down programming approach helped solve some problems and discusses various attempts and experiments that have been achieved by the bottom-up programming approach.

Thus, a well-trained, self-learning code becomes the focus throughout the rest of *The Creativity Code*. While in many instances, the machine code does not create, it nevertheless is becoming a powerful tool for enhancing human creativity. Hence, the concept of AI creativity offers more questions than answers. du Sautoy concludes by saying: "My journey, however, has not produced anything that presents an existential threat to what it means to be a creative human. Not yet, at least" (p. 279). For now, we can exhale and pursue our creative acts without fear of losing our jobs to an algorithm.

**Tetyana Darian**
Tetyana Darian has an MS in Mathematics and is embarking on an MS/PhD in Computational and Integrative Biology. Her interests include research in synthetic and molecular biology, data visualization, and scientific translation.

## The Two Cultures of English: Literature, Composition, and the Moment of Rhetoric

Jason Maxwell. 2019. New York, NY: Fordham University Press. [ISBN-13: 978-0-8232-8245-6. 248 pages, including index. US$28.00 (softcover).]
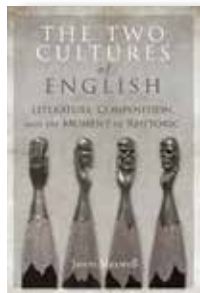
Teachers, students, and anyone else interested in the study of literature, rhetoric, and composition should find *The Two Cultures of English: Literature, Composition, and the Moment of Rhetoric* a good read. Jason Maxwell tackles, in this book, the general topic of how today's universities ask English studies to not so much reflect a liberal arts tradition but instead look at a more vocational curriculum. He looks at the divide between literary studies and composition and feels that English studies today are entering a period of uncertainty and change.

In looking at ideas concerning what he calls the conceptual borders related to the future of English studies, Maxwell feels these borders of English studies are "certain to proliferate at a wild, unpredictable pace in the coming years" (p. 201). He asks, in a big picture way, how "will English and its various fields respond to a world of dwindling economic prospects and impending ecological collapse" (p. 201). After asking this question, Maxwell comes to his conclusion about the unpredictable future of English studies. He ably looks in *The Two Cultures of English* at the relationship of studying literature, rhetoric, and composition in North American universities in the late twentieth and early twenty-first centuries as he makes his predictions about the future of these studies.

### Jeanette Evans

Jeanette Evans is an STC Associate Fellow; active in the NEO community as a newsletter co-editor, currently serving on the newsletter committee; and is co-author of an *Intercom* column on emerging technologies in education. She holds an MS in technical communication management from Mercer University.

## Sojourning in Disciplinary Cultures: A Case Study of Teaching Writing in Engineering

Maureen A. Mathison. 2019. Logan, UT: Utah State University Press. [ISBN 978-1-60732-802-5. 216 pages including index. US$27.95 (softcover)].

*Sojourning in Disciplinary Cultures: A Case Study of Teaching Writing in Engineering* is an interesting and useful book on Writing Across the Curriculum (WAC) and Writing in the Disciplines (WID) through its perspective and content on interdisciplinary collaboration and pedagogy. It is a unique book in that the chapters are written by colleagues who participated as writing consultants in an engineering curriculum reform program, and they each write about different challenges they experienced during that curriculum reform and what they learned from those experiences.

The book is more than about experiences and lessons learned, though, because each chapter addresses critical issues that interfere with WAC/WID and interdisciplinary efforts at most universities. For instance, perspectives on the value of writing, what writing is, and how to teach writing are often contentious topics among colleagues from different disciplines. One benefit that readers may gain from *Sojourning in Disciplinary Cultures* is that such issues are discussed theoretically and practically from various disciplinary points of view, and the authors provide suggested strategies that have come about through research and thoughtful hindsight. The range of subjects include learning to write and writing to learn, the separation between content and form, problems that arise when writing is viewed as scribal and not rhetorical, dealing with resistant faculty, team teaching across the disciplines, pedagogical interventions for teaching about graphics, issues of power and gender inequality, and intercultural collaboration. The intercultural collaboration chapter is especially poignant in understanding intercultural dissonance from macro and micro perspectives by explaining the value of applying a Critical Indigenous Studies approach to Watanabe's sojourning experience as a writing consultant. The explanation of this approach helps readers understand the complexity of issues such as knowledge and power, cultural construction of knowledge, and the binary between quantitative and

qualitative knowledge, especially in terms of teaching writing across disciplines. Even more important, though, is Watanabe's fresh perspective on meeting in the "middle," a necessary component of any interdisciplinary collaboration, but one that is often overlooked or not achieved.

*Sojourning in Disciplinary Cultures* is a valuable resource for a graduate class on technical writing pedagogy as well as for any humanities, engineering, and science faculty who may be engaged in interdisciplinary collaborations or who teach interdisciplinary classes, especially with a WAC/WID focus. One of the most valuable lessons from this book is learning about disciplinary points of view regarding writing and learning how to respect and work through those differences and still be productive and effective in teaching writing to students from all disciplines.

**Diane Martinez**

Diane Martinez is an associate professor of English at Western Carolina University where she teaches technical and professional writing. She previously worked as a technical writer in engineering, an online writing instructor, and an online writing center specialist. She has been with STC since 2005.

## How Knowledge Moves: Writing the Transnational History of Science and Technology

John Krige. 2019. Chicago, IL: University of Chicago Press. [ISBN 978-0-226-60599-9. 444 pages, including index. US40.00 (softcover).]
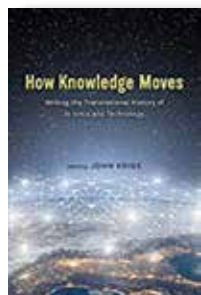
Under what conditions, if any, should countries limit the export and import of scientific information? And what are the consequences of such restrictions? The articles collected in John Krige's *How Knowledge Moves: Writing the Transnational History of Science and Technology* explore this question by examining historical examples of regulations designed to control the transnational flow of knowledge. Ideally, scientists and researchers prefer that knowledge flow freely within a transnational community of academics and researchers. What the articles show, however, is that if history is a guide, knowledge will continue to be controlled by countries for their own geopolitical interests.

These questions are particularly timely given the ways many countries have increasingly infiltrated each other's research facilities and technology companies. Especially in the U.S. the issue has assumed paramount importance because the uncontrolled spread of knowledge threatens American economic and military power. Intellectual property covertly obtained by other countries (especially China) shows up later in subsidized products developed as part of a mercantilist strategy to undermine western economic, political, and military strength. Yet such stratagems are neither new nor modern: sixteenth-century Spain, for example, kept knowledge of its seafaring routes and maritime charts, and the knowledge of its captains and pilots, under tight bureaucratic control (p. 414).

The book's international contributors consider not only the role of the regulatory state, but also broader questions about the impact of the transnational movement of knowledge in complicating and blurring cultural and political distinctions: The rise of English as the "lingua franca" of knowledge transfer (p. 26); the merging of scientific knowledge with "political and military might" (p. 413), particularly in America but also increasingly around the world; the confusing "hybrid selves" that arise from attempting to balance "one's identity as a knowledgeable body with national and political allegiance" (p. 26); and the fundamental paradox at the root of many of these themes—that "transnational knowledge/power subverts efforts to draw stark national divisions" (p. 416), yet "transnational history" also gives "readers a sense of place, of belonging, of identity" (p. 412).

Can such paradoxes, in fact, be resolved, and if so, how? It is hard not to be sympathetic to the contributors' desire for unencumbered knowledge transfer, but it is also inevitable that unless the sovereign nation-state is replaced by global government, the exchange of knowledge will continue to be controlled by the interests of each country, and the restrictions decried in this volume—export controls, regulations, passports, crises of personal and cultural identity, borders themselves—will continue to shape how and when knowledge moves across borders.

The present study's impressive collection of deeply researched, wide-ranging historical analyses is of foundational value in characterizing the issue and lays the groundwork for developing a more productive way of sharing scientific and technical knowledge

internationally, especially when sovereign restrictions are expanding as information becomes an increasingly critical national resource.

**Donald R. Riccomini**

Donald R. Riccomini is an STC member and a senior lecturer in English at Santa Clara University, where he specializes in teaching engineering and technical communications. He previously spent twenty-three years in high technology as a technical writer, engineer, and manager in semiconductors, instrumentation, and server development.

## Conflicts of Interest in Science: How Corporate-Funded Academic Research Can Threaten Public Health

Sheldon Krimsky. 2019. New York, NY: Hot Books. [ISBN 978-1-5107-3652-8. 392 pages, including index. USD $27.99.]

Eroding public trust in science as exemplified by the anti-vaccine movement and climate change skeptics makes *Conflicts of Interest in Science: How Corporate-Funded Academic Research Can Threaten Public Health* particularly relevant today. If scientists are viewed as biased, the results of their research may be dismissed, even if they are scientifically sound. That is why even the appearance of a conflict of interest is detrimental to scientific integrity, Sheldon Krimsky notes.

The book collects his published writings on the prevalence and potential impact of (perceived) conflicts of interest among scientific authors, particularly in biomedicine. It presents 21 articles published between 1985 and 2017 in chronological order. Topics include the social cost of corporate sponsorship of academic research, financial ties between guideline panel members and pharmaceutical companies, scientists as entrepreneurs, the editorial practices of medical journals, and transparency of financial ties between study authors and companies that might profit from their results, among others.

As might be expected with this approach, Krimsky's study results are re-used in multiple articles on similar topics. He traces the distinction between "pure" and "applied" science to the 17th century. Nowadays,

however, Krimsky differentiates between purely academic and industry-funded research. Focusing on medical studies, he observes: "Many medical schools operate on a system where faculty may have tenure but must raise their own salary from sponsored research" (p. 107).

Such a system raises questions about the trustworthiness of the reported results. While financial interests, such as the need for sponsored salaries, do not always influence the research outcome, they may well determine what is—and is not—studied. Such conflicts of interest may also introduce unconscious bias on the researcher's part. And then there is, of course, direct influence, such as Krimsky's own experience with industry trying to suppress his students' environmental report.

In an afterword, Krimsky recommends: transparency through disclosure policies, including sanctions for authors who fail to disclose their conflicts of interest; rejection of private university funding that limits investigative autonomy; strict adherence to government guidelines on advisory board members and their financial interests; a ban on government employees' financial interests in for-profit companies in their field; public availability of company research on drugs, medical devices, pesticides and chemicals, and independent evaluation of these items and substances. "No company should serve as both manufacturer and sole evaluator of their products," Krimsky concludes (p. 315).

While *Conflicts of Interest in Science* raises many interesting issues and provides useful evidence, it could have benefited from more thorough copy editing, especially of the front and back matter.

**Barbara Jungwirth**

Barbara Jungwirth writes about medical topics (www.bjungwirth.com) and translates medical and technical documents from German into English (www.reliable-translations.com). She has written for print and online media since her high school days and majored in media studies. You can find her on Twitter at @bjungwirthNY.

## Who's Afraid of AI?: Fear and Promise in the Age of Thinking Machines

Thomas Ramge. 2019. New York, NY: The Experiment. [ISBN 978-1-61519-550-3. 122 pages. US$9.95 (softcover).]

Open your newspaper on any given day and you'll read about an aspect of Artificial Intelligence (AI) that is appearing on the horizon.

In his book, *Who's Afraid of AI?: Fear and Promise in the Age of Thinking Machines*, Thomas Ramge makes the statement that "artificial intelligence will change the world like electricity did" (p. 19).

One of my favorite places to travel is to Amish country in southern Minnesota. It's like going back into time. Driving down dirt country roads, it's common to pass a horse and buggy and lush farm fields with men, horses, and simple farm machinery. There are large white houses with no electrical lines leading to them. It seems like going a step back into time when there was no electricity.

Today, we stand on the threshold of AI that is poised to take us into a future of technology and robots. We are coming to a point when we will interact with AI in some way in our jobs and daily life.

Ramge addresses many ways our lives will be impacted by AI. Some of the AI benefits are already helping us handle disasters such as Fukushima. As a result, countries competed to determine how to use robots for use in disaster control. South Korea's entry, CRD-Hubo, won the first trial run in June 2015.

He mentions the well-known 2008 movie, *Wall-E*, about a robot who developed a personality, and the famous writer, Isaac Asimov, who wrote about robots in the 1950s. Much has happened with AI since these media were released.

Ramge opens his book by taking you from Kitty Hawk in the Introduction to Tesla in Chapter 1, where machines make decisions. In Chapter 2, he picks up with post World War II and lays out the history of AI. Next, he explores how machines learn. In Chapter 4, he describes virtual assistants like Alexa, Echo, and AI in the medical field. In Chapter 5, he discusses robots as coworkers and describes *cobots*, that are programmed to help people with specific activities. Two of the notable ones are Sawyer and Baxter. He closes by addressing superintelligence and poses the question: Will robots seize control?

Ramge describes various ways in which AI is already being used. Robots are taking over picking fruit from orchards and mowing lawns. Wall-Ye V.I.N., a two-armed robot, can prune up to 600 grapevines a day and record the health of the plants while doing so. The medical industry is already using AI to identify malignant tumors. Aibotiz, a survey drone, can do the work of a survey team and survey 40 acres and complete the survey in 8 minutes!

In a few years from now, we may wonder how we ever got along without AI in the medical arena and the farm fields. We will likely be working alongside a robot.

### Rhonda Lunemann

Rhonda Lunemann is a technical writer with Siemens PLM Software, a senior member and serves on the Program Committee of STC's Twin Cities Chapter, and a member of the MN (Minnesota) Bot Makers.

## Teaching Graphic Design History

Steven Heller. 2019. New York, NY: Allworth Press. [ISBN 978-1-62153-732-8. 304 pages, including index. US$24.99 (softcover).]

How do we teach graphic design history? Is it something that is covered within the studio curriculum, does it warrant its own course? And who will teach that course? For many higher education institutions, these questions represent the core dilemma around the instruction of graphic design history to students of the field. Steven Heller's newly released book *Teaching Graphic Design History* presents many of these issues and more.

At the outset, the audience for this book seems quite narrow, primarily graphic design history instructors. However, as you read through the contents, it becomes clear that the book can serve a much broader audience, which is good since there are relatively few graphic design historians, especially in comparison to art historians. Many instructors will find the book beneficial to their instruction and curriculum development, whether they are engaging students in studio projects that include an element of design history or diving into the teaching of graphic design history on its own.

At some institutions, the curriculum does not include a specific course directed at the study of graphic design history. Therefore, studio instructors find the need to work this history into their courses instead. Alternatively, there is often a need for art historians to teach a course on design history, which may fall outside their specialty; this book will serve those instructors as well. Finally, this book would also be an excellent resource not only for new instructors of graphic design history wishing to build their curriculum but also those who are veterans of teaching graphic design history who wish to stay current or are looking for ways to improve their courses. The book may also appeal to graphic design history students who are interested in understanding in-depth who and what we study when we study graphic design history and why.

*Teaching Graphic Design History* contains a broad selection of essays relevant to the teaching of design history, interviews with design history instructors on what is graphic design history and what are the implications of its instruction, relevant stories on teaching design history, a variety of thematic approaches as well as examples of syllabi and assignments which show how broadly this subject can be covered. The sample syllabi and assignments alone make this a valuable source for instructors, very often these examples include substantive descriptions of how and why the curriculum is taught the way it is, and offers detailed schedules for projects and the semester as a whole. The interviews include many well-respected design historians and authors, such as Louise Sandhaus and R. Roger Remington. Essays and thematic approaches are included from Johanna Drucker, co-author of a graphic design history textbook; Ellen Lupton, Curator of Contemporary design at the Cooper Hewitt Design museum; and of course, from author and historian Steven Heller. *Teaching Graphic Design History* may not answer all the questions on how best to teach, after all some answers must come from the individual giving the instruction, it is an excellent resource on where to begin.

**Amanda Horton**

Amanda Horton holds an MFA in Design and currently teaches graduate and undergraduate courses at the University of Central Oklahoma (UCO) in the areas of design history, theory, and criticism. Ms. Horton is also the director of the Design History Minor at UCO.

## Graphic Design: A New History

Stephen Eskilson. 2019. 3rd ed. New Haven, CT: Yale University Press. [ISBN 978-0-300-23328-5. 472 pages, including index. US$55.00.]
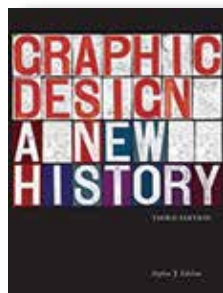
*Graphic Design: A New History* is an elegantly written book that comprehensively covers the evolution of design from hieroglyphics to the digital era. With a focus on art movements and specific artists, it situates graphic design in its historical roots in both the United States and Europe. The book is broken down into chapters that describe the major art movements as they relate to graphic design and has a detailed bibliography organized by chapter along with a very useful glossary that includes definitions of the various art movements, a particularly helpful feature.

One of the great pleasures of reading and reviewing, especially outside one's expertise, is the discovery of a volume that offers education, enlightenment, and perhaps even a bit of amazement. When an author creates a work that immediately elicits a visceral reaction due to its scope or attention to detail, they are challenging the reader to reach a new level of understanding.

Such is the case with this monumental, encyclopedic volume, eloquently written and visually engaging by Stephen Eskilson. If you are a graphic design professional, *Graphic Design* may well become a regular reference, part of your larger library. But if you are a student in the field, or more likely simply an interested, inquiring reader, this volume offers a masters level understanding into the long history, concepts, and personalities of the most influential artists and graphic designers.

A major strength of this book is the artwork, which consists of over 500 images that excellently illustrate the designs of the times. Eskilson deconstructs war time propaganda posters, magazine covers, and album jackets that reveal the underlying messages within their historical context. Numerous examples of art and architecture fill the pages demonstrating the visual styles popular during the various art movements along with their effect on the commercial enterprises, such as logos and advertisements.

I especially enjoyed the discussion on the impact of more recent art trends and his explanation of how

technology has had an impact on graphic design. Eskilson expertly shows how MTV, comics, manga, anime, and graffiti have influenced—and continue to influence—graphic design. During this period, desktop publishing programs and other technical advances in the field broadened it to include film, television sequences, and video games that "popularize[ed] a smooth, exuberantly colorful, and futuristic textureless style" (p. 402). The graphic designer's role has also expanded to include user experience and user interface design, a venue previously the realm of computer programmers.

At roughly 470 pages and slightly less than six pounds, this third edition provides readers with both an intellectual and physical workout. Make no mistake, it is a tome and it would be easy to let it sit on the table radiating potential. But like your favorite pleasure food, once you start reading, you can't stop.

**Lynne Cooke**
Lynne Cooke is currently a Clinical Assistant Professor at Arizona State University where she teaches courses in technical communication, digital writing, and usability. She has presented at several STC conferences and has published two articles on eye tracking in STC's Technical Communication journal.

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### An Overview of Training and Development: Why Training Matters
Saul Carliner and Margaret Driscoll. 2019. Minneapolis, MN: Lakewood Media Group. [ISBN 978-1-0990-4538-7. 303 pages. US$29.95 (softcover).]
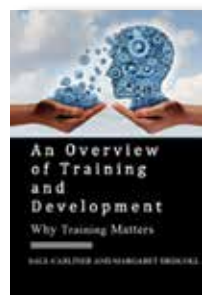


Saul Carliner and Margaret Driscoll guide their readers through the world of training and development (T&D) in their book, *An Overview of Training and Development: Why Training Matters*, by offering a wealth of information and resources that help you de-mystify what T&D professionals do. Chapter 1 introduces the topic, while Chapters 2 and 3 cover the work itself, including the deliverables and the people who produce them. Chapters 4–7 examine the various processes and tools that training professionals use when crafting programs. Chapters 8–9 explore the training profession through the lenses of client focus and business development. The final chapter helps readers strike their own path upon the T&D journey.

Just as most journeys have guides along the way, each chapter concludes with a T&D professional profile pertinent to the topic. For example, in Chapter 9, "Envision Performance Solutions," president Irene Stern Frielich shares her most important business insight: "aligning the learning solution with performance needs in support of the business goals of an organization. Without that alignment, the learning solution isn't really a solution and is not likely to achieve success" (p. 260).

*An Overview of Training and Development* features several well-designed tables and figures that summarize key concepts. Notable examples include typical questions asked during the analysis portion of ADDIE (pp. 100–104), the ABCDs of writing an objective (p. 139), a summary of planning documents used for instructional design projects (pp. 239–243), and the average time needed to create one hour of instruction for various delivery modes and levels of complexity (p. 247).

Besides the clearly organized sections and other useful components, this book encourages active reader participation through its various end-of-chapter activities (quiz questions and answers, discussion questions about various scenarios, and professional assessment checklists) that help the reader synthesize what they just read. For example, the Chapter 3 activity invites readers to rate their levels of interest in working in various training roles, including assessing current and future skills needed (pp. 86–93). To conclude Chapter 10, Carliner and Driscoll designed a thorough, yet easy-to-use, career planning worksheet (pp. 291–298) that assesses all aspects of professional development covered in the first nine chapters.

Overall, *An Overview of Training and Development* is a valuable resource, not only for people who simply want to know what T&D professionals do, but also those who "want" to (or already) work in the profession. For future and current practitioners, these chapter exercises and assessment tools are like having a mentor sit alongside you. At first, I thought those who just want to know more about the profession could skip the end-of-chapter activities. However, these exercises can help managers and supervisors with mentoring their staff. Finally, even seasoned training professionals, especially those who "stumbled" into instructional design, will benefit from the resources listed throughout the book. After all, Carliner and Driscoll say, "the most valuable preparation is on-the-job experience and development" (p. 271).

**Jamye Sagan**
Jamye Sagan is a Senior Member and active in the Instructional Design & Learning SIG, where she has contributed reviews of several Summit sessions for the SIG's newsletter. She has over 15 years of technical communication experience and is the Pharmacy Communications Advisor for H-E-B in San Antonio, TX, Jamye also has written several book reviews for this journal.

## Designing Disability: Symbols, Space, and Society

Elizabeth Guffey. 2018. New York, NY: Bloomsbury Academic. [ISBN 978-1-350-00427-6. 224 pages, including index. US$26.95 (softcover).]

Elizabeth Guffey's *Designing Disability: Symbols, Space, and Society* provides a readable, detailed, and well-referenced history and discussion of the International Symbol of Access (ISA): the now ubiquitous icon of a human figure sitting in a wheelchair. On the surface, the icon appears simple; however, as Guffey explains, the symbol's evolution, development, and proliferation are complex. Numerous years were required to address the wicked problem of developing an internationally acceptable and usable icon.

Whether the ISA's humanizing but disproportionate head should even be present is discussed in depth— the issues surrounding the use of that head mirror multiple past and current conflicts around the ISA. Deftly, Guffey discusses multiple rhetorical, political, social, and identity-drive tensions and polarities that impact the icon as well as larger cultural and social (mis)understandings around disability. A few examples: whether responsibility for addressing access was an individual's responsibility of that of the welfare state; how much development and design can or should be done by an individual versus that of committees and working groups; how much should authority and power be given to design, and those creating designs to represent access and disability, versus the communities that are represented. Readers interested in the politics, power, and design will enjoy Guffey's work and they can follow up on specifics with multiple sources.

Guffey's writing is passionate and connected, but she is not partisan. Her book unveils a wicked problem that multiple communities—disability activists, designers, governments, social workers, colleges, lawyers, and wheelchair users among them—try to address. For readers or scholars new to disability studies, *Designing Disability* is an excellent examination of an everyday familiar icon. Educators working with undergraduates could easily crib key concepts or chapters from "Part Two: Redesigning Signs and Space (1961–1974)" to integrate disability in conversations about the complexities of sign or icon creation. For communication practitioners, Guffey's study reveals how multiple well-intentioned parties collaborate, betray, fight, and promote—all while the icon at issue's meaning is in flux socially.

While Guffey presents the engagement around access and the ISA, she provides brief social and activist histories as well—histories that show how the ISA empowered communities as well as being unrepresentative and inaccurate for most other disabled communities. Guffey's work includes a brief history of the wheelchair, helpful and relevant illustrations, heavy bond paper for easy reading, a solidly developed index, and an impressive bibliography.

*Designing Disability* helps readers understand how highly motivated, ethical, and active individuals and communities can come together and create, struggle with one another, and yield an icon that helps both signify an identity, rights, and understanding to outsiders—and yet, by doing so, at the same time create new, inaccurate stereotypes whereby many citizens assume that if someone is not in a wheelchair, or the disability is not clearly visible to them, then that person must not be disabled.

**Gregory Zobel**
Gregory Zobel is an associate professor of Educational Technology at Western Oregon University.

## Human/Machine: The Future of Our Partnership with Machines

Daniel Newman and Olivier Blanchard. London, England: Kogan Page Limited. [ISBN 978-0-7494-8424-8. 246 pages, including index. US$19.95 (softcover).]
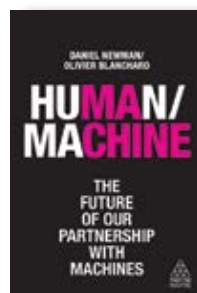
As Daniel Newman and Olivier Blanchard argue in *Human/Machine: The Future of Our Partnership with Machines*, the advent of increasingly powerful, pervasive artificial intelligence (AI) in our lives is not only inevitable, but also evolutionary. Humans, the authors contend,

"cannot succeed as a species without enhancements" (p. 4) and technology in all its forms—including AI—represents just such enhancements, whether as a rock for hammering or as an abacus for counting.

Technology is traditionally understood as strictly instrumental, serving as a "physical extension of a human user's will: an attachment" (p. 3), like a stick that increases reach or leverage. AI moves beyond instrumentalism into decision-making, changing the relationship between humans and technology from "*user* and *instrument*" to "*user* and *helper*" (p. 6). If sophisticated enough, the "helper" could end up replacing the human entirely. The optimum solution is not to replace but to augment human abilities by integrating the strengths of AI—especially its ability to manage repetitive, predictable patterns of work—with the irreducibly human qualities of creativity, intuition, experience, wisdom, and above all, sensitivity to context.

Newman and Blanchard illustrate the contextual limitations of AI by asking how a self-driving car should decide between driving into a wall and "possibly killing its occupants" or driving "into a crowd of pedestrians, saving its occupants but possibly killing the pedestrians" (p. 205). Humans might not have an immediate answer to this moral dilemma either, but at least they would be aware of the moral dimension at issue and might improvise a context-specific way to resolve the problem.

How then to determine the appropriate level of AI-human interaction? The authors offer three models. "Big Brother" results in the "surveillance economy" we experience today, with human interactions and communications tracked ubiquitously and surreptitiously. "Big Mother" has good intentions but ends up "overbearing and intrusive, like an overreaching, overzealous parent" (p. 36). "Big Butler," in contrast, operates as a helpful digital assistant who, unlike Big Brother and Big Mother, respects privacy, completes simple, repetitive tasks, can take limited initiative, and is programmed to alert the user to ambiguous situations rather than independently solve them in rigid, counterproductive, and possibly destructive ways. As a corollary, the authors advise users to distrust any AI system not "under their complete control" (p. 177).

Newman and Blanchard offer detailed proposals and case studies, showing how current workers can actively engage rather than shun AI by developing precisely those skills AI cannot replicate, such as

judgment, flexibility, creativity, and initiative in dealing with the unpredictability that stymies AI systems. Schools should focus on broadly educating workers, not simply training them. STEM alone is not enough. Most importantly, the authors emphasize that AI development should "incorporate more human–machine interactions" (p. 132) from the start, to augment rather than replace humans—a fundamental principle all AI designers should heed.

### Donald R. Riccomini

Donald R. Riccomini is an STC member and a senior lecturer in English at Santa Clara University, where he specializes in teaching engineering and technical communications. He previously spent twenty-three years in high technology as a technical writer, engineer, and manager in semiconductors, instrumentation, and server development.

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### If…Then: Algorithmic Power and Politics

Taina Bucher. 2018. New York, NY: Oxford University Press. [ISBN 978-0-1904-9303-5. 216 pages, including index. US $27.95 (softcover).]

Taina Bucher's *If…Then: Algorithmic Power and Politics* is delightful: she presents multiple engaging critiques about algorithms while simultaneously addressing contemporary issues like fake news, news feeds, and technology "black boxes." Her writing is intellectually interesting and exciting. Chapter 2: The Multiplicity of Algorithms is a fresh and accessible read on multiplicity. While discussing algorithms' complexities, and how they are not simple or easily explainable constructs, Bucher explores multiplicity through Mol's (2002) lens, which initially centered on bodies and medical practice. She fills *If…Then* throughout with similar moves; she connects interesting, relevant ideas to algorithms, thereby integrating multiple disciplines and fields and making her work more readable and accessible.

Chapter 3: Neither Black Nor Box: (Un)knowing Algorithms will hopefully be anthologized in technical communication, science, and technology studies readers. Bucher interrogates the black box concept's illusions and ideology, and then she effectively questions—if not destroys—rhetorical

and political moves that attempt to label technology and algorithms as "black box." As Safiya Noble's *Algorithms of Oppression* (2018) decimates technological neutrality myths, Bucher demolishes technocratic territories and sloppy academic research methods that obey borders defined by meritocratic, profit-driven technology ventures or their surveillance state allies. Allowing technology to be labeled "black box" has political impacts and material implications. Bucher's work reminds scholars and practitioners that we are responsible for questioning and examining technology and content—even that which is labeled "black box."

*If…Then* is relevant in today's political climate; three chapters readily connect with general readers with less experience reading critical theory or technology studies. The fourth chapter, Life at the Top: Engineering Participation, and the sixth chapter, Programming the News: When Algorithms Come to Matter, are timely, given increasing public and political questioning of technology monoliths like Facebook. Similarly, with Trump era fake news claims and social media interventions by multiple parties with unclear agendas, Bucher's heavily cited chapters offer frames for understanding these miasmas. Either chapter is easily excerpted and shared with fresh articles coming out earlier this week, month, or year. Similarly, this method could help undergraduates make connections between research and scholarship based heavily in theory while connecting to contemporary social and political issues.

Throughout *If…Then*, Bucher retains and asserts her humanity with relevant examples of personal experience before eliding into scholarly critical theory that grounds back into lived, daily technology-driven experiences. Her transitional fluidity mirrors Virginia Woolf's (2008) skillful perspective shifts in *Jacob's Room*. Result: pleasurable and impressive scholarship. She models excellence, and Bucher shows how we can do meaningful research in these anti-intellectual times.

Bucher's conclusion, her meditation, is neither dreary dystopian nor delusional utopian. She ends with questions that can further drive research and activism: questions about who can access algorithms, when and where, as well as who or what gets to be part of an algorithm.

**Gregory Zobel**

Gregory Zobel is an associate professor of Educational Technology at Western Oregon University.

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| STC Summit Pre-Conference Courses (full day) | 6 |
| STC Summit Pre-Conference Courses (half day) | 3 |
| STC Annual Summit | 8 |
| Begin and complete a college-accredited course related to the Technical Communication field | 8 |
| Published articles that relate to any aspect of *Technical Communication* (2/article) | 2 |
| Published books publicly available on topics related to *Technical Communication* (5/book) | 5 |
| Presentations at conferences related to aspects of *Technical Communication* (2/presentation) | 2 |
| Total needed within 2 years post-certification date | 12 |

### Fees

Exam fees: STC Members $250, Non-Members, $495

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Lyn Gattis, Editor

# Communication

### How consultants and their clients collaborate in spite of massive communication barriers

"Managers often collaborate with members of consultancies with the aim of improving the performance of their organizations. It is astonishing that, after the completion of such consulting projects, both parties in most cases express satisfaction with the results. It is astonishing because, as [the authors] show in this article, consultants and the managers of client organizations, when engaging in joint projects, have to overcome severe communication barriers. These communication barriers originate from different frames of reference the collaborators refer to, different goals they pursue, and different logics they follow. As [the authors] demonstrate on the basis of an empirical analysis, the communication barriers are overcome predominantly through the use of boundary objects and prototyping."

**Katherine Wertz**

### A path model of workplace solidarity, satisfaction, burnout, and motivation

"Communication dynamics within the business world dictate that the formality of interaction between supervisor and subordinate is determined by the supervisor. The present study investigates the influence of negotiated formality and closeness via supervisor-subordinate solidarity on subordinates' burnout, motivation, and job satisfaction. An online questionnaire was administered to subjects across various occupations and organizations in the United States. The data are consistent with a mediated model in which job satisfaction mediates the relationships between solidarity-motivation and solidarity-burnout. These results are novel in that, first, job satisfaction is identified as an input of motivation and burnout rather than outputs of a shared induction, And, second, the results place renewed emphasis on the role of supervisor communication in the workplace as subordinates are unable to initiate solidarity."

**Katherine Wertz**

### The relationship between aggressive communication traits and organizational assimilation

"This study used theory of independent mindedness as a framework to examine the role of aggressive communication traits in organizational assimilation. Both employee traits and their perception of supervisor traits were examined. Results indicated that employees who are indirect verbally aggressive report lower levels of familiarity with coworkers, acculturation, involvement, job competence, and role negotiation. Additionally, employees who perceive their supervisors as higher in argumentativeness, low in verbal aggressiveness, and low in indirect interpersonal aggressiveness report higher levels of familiarity with

coworkers, familiarity with supervisors, acculturation, recognition, involvement, and role negotiation."

**Katherine Wertz**

# Design

### Ocean-liner cutaways, diagrams, and composites: Technical illustration as mass aesthetic in Popular Mechanics and The Illustrated London News

Ross, S. (2017). *The Journal of Modern Periodical Studies, 8*(1), 1–33. [doi: none]

"This article analyzes the visual rhetoric of ocean-liner illustrations that appeared in mass periodicals in the late-nineteenth and early-twentieth centuries. Cutaways, diagrams, and composite images of ocean liners created an innovative visual style that fused data structures with pop aesthetics, combining pedagogy of media literacy with the pleasures of voyeurism and vicarious voyaging. Illustrations of the Queen Mary and the sinking of the Titanic are emphasized to show how mass periodicals constructed imagined, impossible scenes of ocean travel that humanized abstract, large-scale technological changes and crises of modernity, thereby rendering them comprehensible to a mass readership."

**Edward A. Malone**

# Editing

### Editing in translation: Revision

Mossop, B. (2018). In Chan Sin-wai (Ed.), *Encyclopedia of practical translation and interpreting* (43–72). Hong Kong: Chinese University Press. [doi: none]

"Under a variety of terms (editing, proofreading, checking reviewing, re-reading, quality controlling), revision is generally recognized in the translation industry as a vital step in producing high quality translations. It is thus in part a linguistic activity, in part

a business activity. As a business activity, revision is a cost factor and an aspect of quality assurance (alongside such matters as deadline-meeting, acceptable billing practices, and prompt, pleasant interactions with clients before, during and after a translation job). Revision may or may not involve comparison with the source text. It may also be partial (only parts of the translation are checked), and it may be selective (only certain aspects of the translation are checked, such as specialized terminology or writing quality). Since revision is time-consuming and thus costly, translation services commonly seek to limit the extent of revision activity rather than have a full revision of every text. Certain translations will not be checked by a second person at all, only by the original translator ('self-revision'). Many translation providers (translation agencies, government or corporate translation departments) have written policies governing these matters."

**Edward A. Malone**

# Education

### Assessing an online student orientation: Impacts on retention, satisfaction, and student learning

Watts, J. (2019). *Technical Communication Quarterly, 28*(3), 254–270. doi: 10.1080/10572252.2019.1607905

"To help prepare students for the rigors of an online master's degree in technical and professional communication, [the author] created a course-embedded online student orientation (OSO) structured by the community of inquiry theory of online learning. The study researched the effect of the OSO on student satisfaction, student perceptions of online learning, and students' program retention. The OSO was effective in helping students to reflect on their learning and demonstrated students' interest in peer collaboration."

**Rhonda Stanton**

## Creating a continuous improvement model for sustaining programs in technical and professional communication

Schreiber, J., & Meloncon, L. (2019). *Journal of Technical Writing and Communication, 49*(3), 252–278. doi: 10.1177/0047281618759916

[The authors] "build on previous scholarship calling for sustainable growth in technical and professional communication programs through maintenance and reflection. Inspired by continuous improvement models used in industry, [the authors] offer GRAM—Gather–Read–Analyze–Make—a continuous improvement model designed to identify and align often overlooked practices and processes necessary to build and sustain programs."

**Anita Ford**

## I see what you mean: Mechanical engineering students' use of visuals in a research paper assignment

Bell, S. A. (2019). In M. Mathison, *Sojourning in disciplinary cultures: A case study of teaching writing in engineering* (118–133). Logan: Utah State University Press. [doi: none]

"Technical communication textbooks all agree about the importance of visual communication in engineering discourse, but they may not meet the mark for instruction about how to create and use the types of graphics that engineers consistently rely on: tables, and technical illustrations and diagrams (Wolfe 2009, 363). With these research findings in mind, [the author] was interested in developing some curricular interventions for the first-and second-year mechanical engineering courses [in which the author] was the embedded technical writing consultant. . . . Some students took a 'less is more' approach to including graphical elements, and some took an 'everything including the kitchen sink' approach, by, for example, including multiple photos of design iterations when a final, well-labeled diagram might have been a more effective choice. [The author concludes that] as with all communication instruction, students needed more than just formatting guidelines; they needed to gain a rhetorical understanding of the role of graphical elements in their technical writing."

**Edward A. Malone**

## Including the student voice: Experiences and learning outcomes of a flipped communication course

Kantanen, H., Koponen, J., Sointu, E., & Valtonen, T. (2019). *Business and Professional Communication Quarterly, 82*(3), 337–356. doi: 10.1177/2329490619833397

The authors point out the benefits of flipped classrooms, including improved student engagement and the skills needed for success in careers: interpersonal, teamwork, and negotiation skills. The authors "present a study focusing on the learning experiences of business students in an organizational and marketing communication course. The pedagogical approaches of a flipped classroom, collaborative inquiry, and communication in the disciplines guided the planning of the course. A mixed-methods approach was used. The key findings include positive student evaluations of the pedagogies utilized. Moreover, a wide variety of learning outcomes was reported, particularly in the fields of crisis communication and workplace communication. The pedagogies utilized enabled a comprehensive model for teaching communication and contributed to relevant learning experiences and skill development for the 21st century."

**Diana Fox Bentele**

## Pain or gain? How business communication students perceive the outlining process

Baker, M. J. (2019). *Business and Professional Communication Quarterly, 82*(3), 273–296. doi: 10.1177/2329490619831277

The author presents outlining as a strategy to improve student success, rather than as a product. "This study investigates how students perceive the outlining process. Students in two business communication sections completed a survey regarding outlining perceptions and reasons for outlining or not. Using qualitative content analysis and qualitative coding, the researcher and an independent coder analyzed 34 students' responses regarding outlining process, use, and reasons for outlining or not. Results indicate that students perceive outlining as more useful if their outlining process includes both organization and content exploration and less useful if it excludes organization or content exploration. Notable reasons for not outlining include

concern for outlining time and difficulty generating content for the outline." The author gives specifics for how to get students to buy into outlining, beginning with smaller assignments.

**Diana Fox Bentele**

### Student perceptions of learning and engagement in a flipped versus lecture course

Garner, B., & Chan, M. (2019). *Business and Professional Communication Quarterly, 82*(3), 357–369. doi: 10.1177/2329490619833173

With the current trend toward Writing Intensive components across various disciplines, instructors are pushed to increase students' communication proficiency. These researchers found that writing and oral communication scores were higher among students from flipped classrooms. "Current literature suggests that students have equal or higher learning outcomes in a 'flipped' classroom compared with a traditional lecture. However, there are few robust analyses of the flipped-class teaching method. This research uses a yearlong, quasiexperimental study across six sections of a business communication course to track student outcomes and perceptions of student engagement and learning. The results indicate that there were no significant differences between flipped and traditional classes across the learning and engagement variables in how students perceived these different conditions. However, the flipped condition produced better outcomes for oral and written assignments."

**Diana Fox Bentele**

### Using professional online portfolios to enhance student transition into the poststudent world

Watson, M. (2019). *Business and Professional Communication Quarterly, 82*(2), 153–168. doi: 10.1177/2329490618824703

This article challenges instructors to consider that making students "marketable" is one of a teacher's tasks. It gives a rationale for portfolios and specifics on how to integrate the online portfolio into a writing class. Examples are shown. "Although most students

have learned to succeed academically, by the time they enter . . . business communication courses, their time as students is almost over. This article describes the challenges facing 'students who will soon stop being students' and introduces the professional online portfolio as a project which enables them to develop the confidence, the capacity, and a concrete platform with which to communicate with the world outside the black box of school." The author uses the e-portfolio assignment as a means to engage students in writing assignments.

**Diana Fox Bentele**

## Ethics

### Empty templates: The ethical habits of empty state pages

Gallagher, J., & Holmes, S. (2019). *Technical Communication Quarterly, 28*(3), 271–283. doi: 10.1080/10572252.2018.1564367

"This article examines how empty state pages (ESPs) constrain user-generated communication through the ethical lens of Bourdieu's *habitus*. The authors define ESPs as interactive instructional templates that prompt users to input information to participate in an online network. Through a case study analyzing ~450,000 online comments from *The New York Times*, the authors find a direct connection between ESP elements, such as the character limit for comments, and online writers' cultivated habitus."

**Rhonda Stanton**

### Media frames and crisis events: Understanding the impact on corporate reputations, responsibility attributions, and negative affect

Mason, A. (2019). *International Journal of Business Communication, 56*(3), 414–431. doi: 10.1177/2329488416648951

"This study aims to grow our current understanding of situational crisis communication theory by expanding on the conceptualization of causal responsibility as the primary mechanism contributing to the cognitive

formulation of blame by stakeholder groups. By doing so, this research sought to assess the differential impact of common media frames of crisis events in order to inform organizational crisis communication efforts. A total of 186 students participated in an experimental study from a Midwest university. A series of multivariate analyses of variances were computed to assess the hypotheses advanced in the study. Results indicated that crisis frames can negatively affect organizational reputations. Episodic frames were found to amplify the reputational threat levels in both the victim and accidental clusters. Findings also indicated that when stakeholders perceive the source of the media report as being highly credible, more negative perceptions toward the organizations involved in the crisis were generated. The results help inform the corporate communication response process designed to address the 'image' of a crisis as an attribute of consideration, in relation to the framing of the crisis event. Limitations and future directions are offered."

**Katherine Wertz**

# Health communication

### The paradox of smoking & perceived stress: Do graphic health warnings influence smokers under high stress in adverse ways?

Cho, H. Y., Chun, S., & Choi, Y. (2019). *Health Communication,* Jul 3: 1–8 [Epub ahead of print]. doi: 10.1080/10410236.2019.1636339

"The positive effects of graphic health warnings (GHWs) on quitting smoking have been widely demonstrated in the literature on cigarette warning. However, recent findings of smoker reactance to GHWs demand investigations of factors that may constrain the effects of GHWs. The current study sought to identify conditions in which GHWs do not have a positive impact on smokers' desire to quit with a focus on smokers' perceived stress. Two hundred and forty-four smokers in South Korea were exposed to either a text-only or a GHW cigarette pack in a between-subjects experiment. Results from this study suggest that the GHW condition is effective in increasing

attention to the GHW, enhancing perceived usefulness of information, and desire to quit only among those with low (vs. high) perceived stress. In addition, an interaction effect between warning type and perceived stress on the desire to quit was sequentially mediated by attention and perceived information effectiveness. Based on the results, [the authors] suggest that GHWs were less effective for smokers with high levels of perceived stress because their stress appeared to exhaust the cognitive resources necessary to process the information."

**Walter Orr**

### Worst practices for writing CME [continuing medical education] needs assessments: Results from a survey of practitioners

Harting, D., & Bowser, A. (2019). *American Medical Writers Association Journal, 34*(2), 51–54. [doi: none]

"Needs assessments (NAs) are commonly developed to identify gaps in the knowledge, competence, performance, and confidence of health care providers and to guide the development of continuing education activities designed to remedy these deficiencies. Although best practices of NA development have been thoroughly described, little work has been done to evaluate poor or unprofessional practices that may compromise their value or validity. [The authors] sought to describe these practices with a survey primarily targeted toward individuals who develop NAs. . . . Respondents to an annual survey were prompted to describe unprofessional or poor practices that they had observed in NAs developed by other writers. Responses were categorized by 2 independent reviewers. . . . A total of 104 individuals submitted responses to the survey. Of those, 67 included write-in responses describing poor practices. The most common poor practices were related to sources and referencing (19 responses), whereas other commonly cited poor practices included irrelevance or poor focus; organization, coherence, and readability issues; and plagiarism, fabrication, or bias. Specific quotations from write-in responses are provided in this article. . . . Despite available resources that outline and teach best practices in writing CME NAs, writers continue to struggle with referencing, organization, coherence,

and readability. This may present an opportunity for the industry to consider new best practices that would encourage standardization and eliminate some of the poor practices described here."

**Walter Orr**

# Instructions

### Becoming caregivers: Companion robots and instructions for use

Caudwell, C. B. (2019). *Journal of Asia-Pacific Pop Culture, 4*(1), 42–58. doi: 10.5325/jasiapacipopcult.4.1.0042

"Concerns and speculations about relationships between humans and robots cross disciplinary bounds, from engineering and design to popular culture, ethics, and philosophy. While there is abundant material on the appearance, function, and interaction of social robots as objects, there is an absence of discussion and research addressing the instruction manuals, packaging, and marketing material that contextualize the relationship between robots and people. Instruction manuals, a form of technical communication, are where some of the first introductions are made between robots and their caregivers, and where the boundaries for their relationship are first laid out. The study of technical communication itself is well established—a cultural perspective on this topic is rare—but vital in assessing the cultural, political, and ethical dimensions of technology. Through a case study of Furby, an early example of a simple, companionable robot, this research explores the role that instruction manuals, and other related ephemera play in defining relationships with robots, and suggests an approach for analyzing artificial companionship as it develops into new and more complex forms."

**Edward A. Malone**

# Intercultural issues

### Are strategic communication management competencies and personal attributes global? A case study of practice in Finland and New Zealand

Brunton, M., Kankaanranta, A., Louhiala-Salminen, L., & Jeffrey, L. (2019). *International Journal of Business Communication, 56*(2), 151–172. doi: 10.1177/2329488415608846

"The drive to both maintain competitiveness and to meet marketplace expectations using the strategic management of communication is a feature of the international workplace. In the complex and dynamic commercial environment of the new millennium, this drive includes the imperatives to employ competent communication professionals. Whether organizations are intent on acquiring or developing proficient practitioners, the ability to achieve these aims rests on the identification of relevant competencies and attributes. This study uses the Critical Incident Technique to explore the practice of Communication Management in a sample of practitioners in New Zealand and Finland—two geographically disperse countries. The identified critical incidents mostly related to managing crisis communication across both countries. To manage the incidents, communication practitioners predominantly used two competencies: stakeholder relationship management and external interface management. In addition, the personal attribute of adaptability was most commonly employed in both countries. Despite the similarity of incidents and the competencies and attributes required to manage them, also variability in practitioners' strategic and personal responses was evident."

**Katherine Wertz**

### Emotion, social action, and agency: A case study of an intercultural, technical communication intern

Pickering, K. (2019). *Technical Communication Quarterly, 28*(3), 283–253. doi: 10.1080/10572252.2019.1571244

"This article reviews literature on emotions within communication settings and proposes that emotions

serve as motivations to accomplish social action; these motivations also serve as opportunities to negotiate agency within unfamiliar workplace settings. To exemplify the way this process develops, the author presents a case study of a technical communication intern as she works full-time for a German sales and distribution company. Through reflective self-narratives, the intern describes specific emotions she experiences as she adjusts to this German workplace. These emotions connect directly to decisions the student makes that help her negotiate agency from a 'powerless' position, resulting in effective workplace relationships and a competent persona."

**Rhonda Stanton**

### Textual voices in corporate reporting: A cross-cultural analysis of Chinese, Italian, and American CSR reports

Bondi, M., & Yu, D. (2019). *International Journal of Business Communication, 56*(2), 173–197. doi: 10.1177/2329488418784690

"This article investigates direct quotations in a corpus of corporate social responsibility (CSR) reports in Italian, Chinese, and English. The corpus is composed of 60 CSR reports published by Italian, Chinese, and American companies in the banking and energy sector. The study aims at exploring what types of textual voices are involved in the discourse of CSR reporting and how different sources of voices are represented, using the framework of social actor representation proposed by Van Leeuwen. The results show that the voices presented in direct quotations are often 'orchestrated' by companies into 'symphony' rather than 'polyphony.' Most of the sources of direct quotations are represented as individuals with specified names. The comparative analysis shows that companies from different cultural backgrounds present different preferences in selecting and representing the various sources. The Italian and American CSR reports present more voices from managers, while the Chinese CSR reports show a clearer preference for voices from employees and clients."

**Katherine Wertz**

## Language

### Correlates of physicians' and patients' language use during surgical consultations

Tran, B. Q., & Sweeny, K. (2019). *Health Communication,* Jun 3: 1–8. [Epub ahead of print]. doi: 10.1080/10410236.2019.1625001

"A multi-method approach was used to explore correlates of technical and complex language use within 145 audio-recorded physician-patient interactions. When discussing the prospect of surgery, physicians used more technical and complex language (more jargon, larger words, longer sentences) than patients on average. Patients' demographic characteristics (education, health literacy, English fluency) and markers of health (condition severity) inconsistently predicted physicians' and patients' use of complex and technical language. Interactions with happier and more hopeful patients involved less technical and complex language, but physicians' language use was unrelated to patients' emotions following the consultation. Finally, physicians' use of more technical language predicted greater patient satisfaction following the consultation, and physicians' use of more complex language at the initial consultation predicted better adherence by patients following surgery. [These] results highlight the nuanced role of language use within healthcare interactions and identifies language complexity as a novel target for health communication research."

**Walter Orr**

### Verbal quantifiers and communicating painkiller side effect risk

Cox. J. G. (2019). *Health Communication,* Jun 21: 1–10 [Epub ahead of print]. doi: 10.1080/10410236.2019.1632402

"The two studies reported here explore the use of verbal quantifiers (e.g., 'common') as an alternative to the numerical presentation of risk information about prescription drugs. Guided by work on adverb-adjective pairs (Study 1) and research on fuzzy trace theory (Study 2), predictions are made about participants' risk perceptions after reading verbal presentations of a medication's side effects. Participants report their

perceptions about the drug's side effects' occurrence among users. In Study 1, pairs of adverbs and adjectives (e.g., 'very rare') are used in contrast to adjectives alone to convey numerical risk information. In Study 2, severity and more general risk perception measures are added to better understand bottom-down schema processing. Findings show that individuals vastly overestimate the likelihood of side effects occurring, compared with the European Union's CIOMS III recommendations (e.g., 'rare' side effects affect .01-.1% of users), and demonstrate support for the differences between gist and verbatim processing of risk information."

**Walter Orr**

# Management

### The diffusion process of strategic motivating language: An examination of the internal organizational environment and emergent properties

Mayfield, J., & Mayfield, M. (2019). *International Journal of Business Communication, 56*(3), 368–392. doi: 10.1177/2329488416629093

"Motivating language (ML) is a leader oral-communication strategy which has been significantly linked to such positive employee outcomes as higher job performance, increased job satisfaction, lower intention to turnover, and decreased absenteeism. However, most ML research has not targeted an organizational system at multiple levels. In brief, we have not looked at how this beneficial form of communication is actually implemented throughout an organization, including at the CEO level. In response to this gap, [the authors'] main goals were to identify robust hypotheses on ML diffusion for future empirical testing, better understand the emergent processes of ML adoption within an organization, and advance development of related theory. These goals were achieved through an agent-based simulation model, drawn from management, communication, and social network scholarship. More specifically, overview, design concepts, and details protocol and NetLogo software were applied to simulate ML diffusion among all leader levels within an

organization. This model also captured the influences of predicted moderators, and results were then interpreted to create testable hypotheses. Findings suggest that top-leader oral language use and organizational culture have the most profound impact on ML diffusion, followed by rewards, with partial weak support for the effects of training, turnover, and time. Recommendations were also made for future research on this topic, especially for empirical tests."

**Katherine Wertz**

### How can leaders overcome the blurry vision bias? Identifying an antidote to the paradox of vision communication

Carton, A. M., & Lucas, B. J. (2018). *Academy of Management Journal, 61*(6), 2106–2129. doi: 10.5465/amj.2015.0375

"Evidence suggests that organizational leaders can inspire employees by communicating a vision of the future with image-based rhetoric—**words** and phrases that are readily envisioned in the mind's eye (e.g., 'our vision is to make moviegoers laugh'). Yet research has demonstrated that most leaders do not craft visions with image-based rhetoric, instead favoring abstract language that cannot easily be visualized. [The authors] integrate theory on leadership and dual cognitive processing to argue that this problem is exacerbated when leaders focus on **word** selection when crafting visions because they overemphasize the meaning-based cognitive system (in which they consider the abstract meaning of **words**) and underemphasize the experience-based cognitive system (in which they can generate vivid mental images of what the future could look like). [The authors] introduce a novel tactic to help leaders activate the experience-based system and, in turn, generate and communicate more impactful visions. [They] also investigate boundary conditions . . . [and] test [their] predictions with three experiments featuring three distinct samples, including one with senior corporate executives and one in which members of the British government crafted visions on the day Britain announced it would exit the European Union ('Brexit')."

**Yvonne Wade Sanchez**

## Impeded opportunities: The content and consequences of structures constraining supervisors' communication with older workers

As the workforce ages and as people are willing and able to work later into life, managers face the task of successfully acquiring and retaining older workers. This research found that communication affects these tasks. "Supervisors are confronted with the challenge to support the employability of rapidly aging teams. Drawing on structuration theory, two studies construct and test a conceptual model of how structures (rules and resources) constraining supervisors' communication with older workers impede older workers' job performance and access to promotion. A set of constraining structures was qualitatively identified through in-depth interviews and subsequently quantified in a survey. The results reveal a set of constraining structures that obstruct supervisors' conversations with older workers and consequently hinder employability outcomes. If older workers are to take advantage of national and organizational policies and resources aimed at improving their employability, these constraining structures should be targeted."

**Diana Fox Bentele**

## Investigating the dark side of stories of "good" leadership: A discursive approach to leadership gurus' storytelling

"Since the quest for locating an agreed upon prediscursive phenomenon behind the word 'leadership' has proved fruitless, some researchers have suggested that leadership is an empty signifier to which many meanings can be attached. Taking this ontological shift seriously, rather than trying to locate leadership as a 'thing' that is out there somewhere, it is perhaps better to investigate how meanings of leadership are constructed as in situ social practice. Adopting a discursive approach to leadership and using transcripts of a celebrity interview with management gurus Jack and Suzy Welch, this article analyzes the stories they tell in which they provide normative accounts of what good leadership should be. Rather than taking these stories at face value, this article investigates both the way in which these stories are told as in situ social practice and the Discourses of leadership that are used as resources for storytelling and which are (re)produced in the storytelling. Findings indicate that while Jack and Suzy Welch do morally accountable identity work that presents leadership as heroic and positive, these stories also hide a darker side of leadership that is revealed in the analyses of wider societal Discourses that are invoked. The article closes with a call for a more critical approach to stories of leadership."

**Katherine Wertz**

## Leaders' behaviors during radical change processes: Subordinates' perceptions of how well leader behaviors communicate change

"This research asked 252 upper-, middle-, and first-line-level managers in organizations experiencing radical change to assess the effects of their own leaders' communications and behaviors on their perceptions of the change process. Results indicated that the frequency of exhibition of most behaviors by leaders positively affected subordinates' perceptions of change. For three types of behaviors, soliciting upward feedback, driving change, and providing resources, the importance of these behaviors to the subordinates' moderated perceptions of the change process. Discussion of these results and their implications conclude the study."

**Katherine Wertz**

## A look at leadership styles and workplace solidarity communication

"Leadership styles that promote upward and downward communication have been shown to foster a plethora of positive outcomes within the workplace, group collaborations, and team contexts. Similarly,

supervisor-subordinate solidarity communication has been related to desirable workplace outcomes. The purpose of this study was to investigate leadership styles as related to solidarity communication. The authoritarian leadership style was associated with the lowest solidarity and consistently yielded the least job satisfaction and highest burnout in subordinates. Furthermore, subordinates with authoritarian leaders did not fit the supervisor-subordinate solidarity model. A more nuanced explanation of leadership communication as related to solidarity is discussed."

**Katherine Wertz**

# Professional issues

## Can perceptions of an individual's organizational citizenship be influenced via strategic impression management messaging?

Adame, E. A., & Bisel, R. S. (2019). *International Journal of Business Communication*, *56*(1), 7–30. doi: 10.1177/2329488415627355

"A two-part investigation explored whether strategic messaging can influence others' perceptions of one's organizational citizenship. In a first study, inductive analysis of interviews (N = 24) revealed working adults hold implicit rules for how (and how not) to present themselves to their colleagues as good citizens: The rules require organizational members' attempt to avoid being interpreted by colleagues as motivated by personal gain or working through ostentatious means. Then, the content of impression management (IM) messages were crafted—based on these rules—and used for a message-processing experiment (N = 274). Analysis demonstrated working adults' perceptions of organizational citizenship behavior were influenced by strategic self- and other-referential messaging regarding motives and means. Results imply that strategic IM messaging, which conforms to the rules of organizational citizenship behavior impression-construction, are rewarded with audience perceptions of being citizenly. Implications for IM in the workplace are discussed."

**Katherine Wertz**

## Development of technical communication in China: Program building and field convergence

Ding, H. (2019). *Technical Communication Quarterly, 28*(3), 223–237. doi: 10.1080/10572252.2018.1551576

"This article examines the emergence of technical communication as an academic field in China from the perspectives of pedagogy, program building, market needs, professionalization, and local sociopolitical contexts. Highlighting the close disciplinary connections between translation and technical communication, it identifies visionary faculty with overseas experiences as national leaders in curriculum innovation. It also explores the close industry-academia connections facilitated by semi-open WeChat groups and existing approaches to building international partnerships with technical communicators in China."

**Rhonda Stanton**

## Learning to contradict and standing up for the company: An exploration of the relationship between organizational dissent, organizational assimilation, and organizational reputation

Croucher, S. M., Zeng, C., & Kassing, J. (2019). *International Journal of Business Communication, 56*(3), 349–367. doi: 10.1177/2329488416633852

"This study explored relationships between organizational assimilation, organizational reputation, and organizational dissent. Survey data collection using standard instruments was conducted with a sample of employees drawn from three countries (the United States, the United Kingdom, and Australia). Analysis revealed that the expression of dissent to management and to coworkers was significantly and positively correlated with both organizational assimilation and organizational reputation. In particular, findings suggest that employees who reported being more socialized within their respective organizations also expressed more dissent to managers and to coworkers. Similarly, employees who reported perceiving their organizations as more ethical and reputable were more likely to express dissent to managers and coworkers. Additional analyses indicated that the relationships identified between variables were immune to the

effects of organizational tenure and national culture. In particular, the results show that organizational assimilation is a key determinant of organizational dissent and that organizational reputation is a key reason that employees express it."

**Katherine Wertz**

### Left in the dust: Employee constructions of mission and vision ownership

Kopaneva, I. M. (2019). *International Journal of Business Communication, 56*(1), 122–145. doi: 10.1177/2329488415604457

"Research on organizational mission and vision primarily has approached the concepts from managerial perspectives. This study employed a communicative constitution of organizations perspective to problematize the concepts of mission/vision alignment and assimilation and to focus on employee mission/vision ownership. The study sought to understand how employees construct ownership, that is, their ability to control, change, or contribute to mission and vision. A thematic analysis of 46 in-depth interviews with employees from 22 organizations revealed factors that impede employee ownership and those that facilitate it. The findings have important implications for understanding an employee's role in the construction of organizational reality."

**Katherine Wertz**

## Research

### Do scientific objects have a history? Pasteur and Whitehead in a bath of lactic acid

Latour, B., & Davis, L. (2019). *Common Knowledge, 25*(1), 126–142. doi: muse.jhu.edu/article/727130

"Latour in this essay criticizes and abandons the approach to science studies—in which the object of study is presumed to be inert and passively circulating amid networks of practices, institutions, authorities, and historical events—that he took in 'The "Pédofil" of Boa Vista,' an article published in the spring 1995 issue

of *Common Knowledge*. Here he argues that Whitehead's neglected text Process and Reality offers the possibility of a radical historical realism that puts the scientific object and the scientist's laboratory on the same footing. His case study is of the Lille laboratory where, in 1858, Pasteur identified a yeast responsible for lactic fermentation. Even as Pasteur acted to cause the yeast to emerge, he felt—in a way that practicing scientists often attest—that he was 'led' to do so by the propensity of things. Whitehead enables us to understand that it was not Pasteur alone who altered the representation of fermentation; the fermentation itself modified its manifestation. Hence there is historicity not only on the human side of scientific discovery—the story of Pasteur and his yeast—but also historicity on the nonhuman side—the story of the yeast and its Pasteur."

**Edward A. Malone**

## Rhetoric

### Communicating elective sterilization: A feminist perspective

Davis, S., & Dubisar, A. M. (2019). *Rhetoric of Health & Medicine, 2*(1), 88–113. doi: 10.5744/rhm.2019.1004

"Patient-OBGYN (obstetrics and gynecology) communication about contraception and reproduction can be fraught with ideological pressures, cultural assumptions, and emotion-based claims and concerns. Specifically, the topic of elective sterilization for women often invokes preconceived notions of femininity and mothering. Based on medical pamphlets and online discussion forums, [this] analysis reveals how gendered discrepancies exist in medical information about elective sterilization. This persuasion brief aims to invite OBGYNs to understand how cultural and traditional views of gender inform medical decisions and oppress women's reproductive autonomy. It offers suggestions for OBGYNs, women seeking sterilization, and scholars in the rhetoric of health and medicine."

**Edward A. Malone**

## Computational approach to assessing rhetorical effectiveness: Agentic framing of climate change in the congressional record 1994–2016

"The goal of this paper is to consider rhetorical effects as the propagation of rhetorical expressions across large sets of texts, measured by the extent to which rhetorical expressions, structures, or practices become replicated in texts and sites of rhetorical in(ter)vention. The paper draws on lines of scholarship in the digital humanities and computational rhetoric—primarily, sequential structuring of semantic contexts, semantic parsing of unstructured text, and diachronic tracking of textual expressions—to extend their conceptual and methodological insights into a computational framework for assessing rhetorical effectiveness. It offers a test case for this concept through an analysis of how Congress has framed human agency toward addressing climate change."

**Rhonda Stanton**

## A neonatal intensive care unit (NICU) soundscape: Physiological monitors, rhetorical ventriloquism, and earwitnessing

"Considering aurality (hearing) and sonicity (sounds/noises) in our research sites promises much for rhetoric of health and medicine (RHM) scholars. To show this value, [the author argues] aural awareness of soundscapes provides opportunities to sensorially enrich our understanding of sonic experiences in acute care hospital settings, as in the neonatal intensive care unit (NICU) site at the center of [this] case study. To that end, the purpose of this article is threefold: 1) to identify aurality as a sensorial aspect in healthcare sensescapes worthy of RHM inquiry; 2) to foreground how these soundscapes shape care and caretaking in healthcare and clinical settings; and 3) to propose more careful considering and attending, as 'earwitnesses,' to the sonic experiences of bodies in these settings." The author proposes 'rhetorical ventriloquism' as a

useful, responsible concept to consider how these sounds and noises appear to stand in for bodies and their physiologies and shape those bodies' care, while amplifying those bodies as the healthcare technologies speak and sound for them." The author suggests that "RHM scholars can act as earwitnesses who attend to sonicity and aurality in healthcare and clinical settings, as well as study how people are sensorially trained in these settings."

**Edward A. Malone**

## Rhetorical tactics to influence responsibility judgments: Account giving in bank presidents' letters during the financial market crisis

"This content analysis investigates bank presidents' letters in the aftermath of the financial market crisis (2007/2008). [The authors] posit that managers use accounts as a rhetorical device in order to influence responsibility judgments of stakeholders." The authors develop their hypothesis by drawing on "attribution theory, self-presentational theories and research on account giving." From their model of responsibility judgment, the authors "infer how banks will react to their financial performance after the financial market crisis (2007/2008)," testing this hypothesis "with a sample built from 91 U.S. and European banks, which were all severely hit by this crisis. [Their] results indicate that bank managers use accounts as linguistic devices to influence the responsibility judgments of stakeholders: Refusals and to relativize are used to influence their situational perception, concessions and excuses target on locus and controllability perceptions, and initiatives and outlooks affect stability perceptions."

**Katherine Wertz**

## The right word for the right crowd: An attempt to recognize the influence of emotions

"The purpose of this paper is to propose a better understanding of how entrepreneurial narrative influences resource acquisition in the fundraising context. . . . The paper combines the literature on emotion as information theory from psychology with behavioral finance findings to develop a conceptual framework with research proposals highlighting the use of narratives in the crowdfunding process. . . . [T]he paper advocates that entrepreneurial narrative may influence crowdfunders' attitude and decision to fund a project. It theorizes how emotions in narratives shape the funders' attitude toward a project and, in turn, their decision to support it. This potential influence is qualified by taking into account the funders' primary motivations. These motivations affect the degree to which funders rely on affect or cognition to form their attitude and to which they are influenced by more emotional or cognitive narratives."

**Yvonne Wade Sanchez**

## Science communication

### There's no such thing as scientific controversy

"[The authors] examine 81 rhetoric and technical communication studies of 'scientific controversy.' [Their] praxiographic analysis reveals that 'scientific controversy' is not one thing but three, each staged according to a radically different ontology; yet the literature continues to handle these ontologies the same and to privilege scientists' demarcation claims in their analysis. [The authors] conclude the modifier *scientific* should be abandoned entirely in controversy studies and recommend an antilogical rather than dialectical approach to controversy."

**Rhonda Stanton**

## Technology

### Error aligned

"This essay tracks the digital afterlives of etaoin shrdlu, typographic error turned textual agent. A media effect of Linotypes, this phrase was meant to notify editors that their compositors' fingers had slipped during transcription and a hot-metal line needed to be pulled. It was an internal memo, passed around the printshop—and it is now a recurring text string in digital archives of newspaper pages, where the phrase's accidental inclusion in printed matter has been newly reset by automatic transcription processes. After examining the place of Linotypes in a long history of machine reading, [the author argues] that the presence of this machine's error signal in digital corpora presents an opportunity to consider the extent to which automatic transcription works from an interpretive disposition."

**Edward A. Malone**

## Theory

### Queering tactical technical communication: DIY HRT

"Given the barriers for transgender people to access affordable gender-transition care, online environments have witnessed a rise in user-generated instruction sets providing direction on the self-administration of hormone therapy. These ethical forms of tactical technical communication demonstrate the need to consider a new materialist approach to queer theory, which refuses to align queer agency with stable identities. Drawing directly from these user-generated instructions, this article articulates a theoretical framework for queer, tactical technical communication."

**Rhonda Stanton**

# Usability

### An ethic of constraint: Citizens, sea-level rise viewers, and the limits of agency

Richards, D. P. (2019). *Journal of Business and Technical Communication, 33*(3), 292–337. doi: 10.1177/1050651919834983

"The design of online interactive visualizations is an ongoing area of research within technical communication, with recent work focusing on visualizations in risk-based contexts. This article shares the results of a large-scale user experience study on a popular interactive sea-level rise viewer aimed at facilitating decision making for individual users in coastal communities. Using this viewer, participants performed three major tasks related to individual property, community impacts, and future projections and gave feedback on the design, use value, and functionality of the tool. The participants were assessed on their ability to complete the three major tasks. The author discusses the implications of these results on the continued design of interactive risk visualizations and argues for a vision of user agency that is more constrained within the larger ethical paradigms of environmental communication."

**Sean C. Herring**

### Reducing harm by designing discourse and digital tools for opioid users' contexts: The Chicago Recovery Alliance's community-based context of use and PwrdBy's technology-based context of use

Bivens, K. M. (2019). *Communication Design Quarterly, 7(2),* 17–27. doi: 10.1145/3274995.3274998

"The United States is struggling with an opioid overdose (OD) crisis. The opioid OD epidemic includes legally prescribed and illicitly acquired opioids. Regardless of if an opioid is legal, understanding users' contexts of use is essential to design effective methods for individuals to reverse opioid OD. In other words, if health information is not designed to be contextually relevant, the opioid OD health information will be unusable. To demonstrate these distinct healthcare design contexts, [the author extends] Patient Experience Design (PXD) to include community-based and technology-based contexts of use by analyzing two case examples of the Chicago Recovery Alliance's and PwrdBy's attempts to decrease deaths by opioid OD. Next, [the author discusses] implications of community-based and technology-based PXD within communities of opioid users, critiquing each method and suggesting four contexts of use-heuristic categories to consider when designing health communication information for users in these contexts."

**Lyn Gattis**

# Writing

### Finding our missing pieces: Women technical writers in ancient Mesopotamia

Raign, K. R. (2019). *Journal of Technical Writing and Communication, 49*(3), 338–364. doi: 10.1177/0047281618793406

"Contrary to current scholarship in technical communication, which places the first women technical writers in the period of 1641–1700 AD, the first technical documents were written by women in 2400 BCE—eight centuries earlier. Enheduanna—the first woman writer and the first nonanonymous author ever identified—wrote many of the period's great poems, including A Hymn to Inanna. Her work calls into question our discipline's belief that persuasive writing began with Homer and was conceptualized largely by men. This fact has the potential to completely revise the history of both technical and persuasive writing, and women's role in that history."

**Anita Ford**

### The primary care clinic as writing space

Opel, D. S., & Hart-Davidson, W. (2019). *Written Communication, 36*(3), 347–465. doi: 10.1177/0741088319839968

Technical writing plays a part in studies of how to improve efficiency and outcomes for the U.S. healthcare system. "In a primary care health clinic, providers before, after, and throughout their shifts retrieve archival patient information and document

new empirical data from each patient encounter into an electronic medical record (EMR). This documentation, called charting, contributes to ever increasing workload and provider burnout. While a provider may not perceive it to be, 'charting' is writing work, and the clinic is a writing space. In this article, [the authors] use the concept of writing stewardship to examine a needs analysis of workflow in a family health center. [They] argue that the addition of writing stewards would shift the burden of documentation practices to distribute writing throughout the clinic, not primarily on providers. The implications of this are twofold: first, that writing studies researchers can help clinics write more efficiently and, second, that patient outcomes improve as a result of improved clinical communication." The authors draw the line between technical writers as researchers and patients as subject matter experts to make the case for how today's focus on EMRs demand more attention to writing to create the health outcomes we need.

**Diana Fox Bentele**

### Punctuation as rhetorical notation? From colon to semicolon

"The word punctuation is not used in English until 1593. The earlier term, used from the late Middle Ages, was pointing, which meant a sign system for pausing in reading. This rhetorically based principle of punctuation continued to operate during the sixteenth century but was gradually superseded by the logical system, which mapped out the grammatical structure of a sentence. The punctuation mark that best typifies the earlier system is the colon, since this was used to identify the cola (members) of a periodic discourse and represented a mid-length pause. This essay . . . discuss[es] different uses of the colon in a range of printed texts from the second half of the sixteenth century (psalms, hexameter verse, translations from Cicero, prose pamphlets, and drama). Neil Rhodes argues that the 1590s is the decade when the semicolon supersedes the colon in a move that encapsulates the broader transition from pointing to punctuation."

**Edward A. Malone**